

MOTOR AGE

Vol. XXX
No. 5

CHICAGO, AUGUST 3, 1916

Ten cents a copy
Three dollars a year

35,000 More Hudson Super-Sixes

An Announcement of Hudson Policy

We have today to Announce

Detroit, Mich., July 1, 1916

That more than ten thousand Hudson Super-Sixes have now been delivered to owners.

That we have in four months, by tremendous exertion, quadrupled our daily output.

That we have parts and materials, on hand and in process, for 20,000 more of the present Super-Six. Constantly increasing demand has just forced us to place contracts on materials for an additional 15,000.

That at least 35,000 more of the Hudson Super-Six will be built like the present model. Our production is now 3,500 monthly.

After eight months of experience, with 10,000 cars, not one important improvement in design suggests itself to our engineering corps. So the Super-Six will remain as it is. And, because of our patents, it will maintain its supremacy.

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Motor Driven Tire Pump

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Most good cars are now equipped with the Stewart Tire Pump before they leave the factory.

It's only a matter of time before all good cars will be.

A pump is more necessary and a greater advantage than any other accessory.

The Stewart Tire Pump is the best—and the most inexpensive.

"No car is better than its accessories"

The Stewart-Warner Speedometer Corporation
Chicago, Ill., U. S. A.





MOTOR AGE



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RENEWALS or CHANGE OF ADDRESS should be sent two weeks in advance of date they are to go into effect. Be sure to send old as well as new address to avoid unnecessary delay. RECEIPT of first copy is acknowledgment of subscription.

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ANNOUNCEMENTS

"How France Makes Military Chauffeurs," a story having to do with the drastic measures which this belligerent country has been obliged to adopt to whip into shape enough trained men to handle the horde of motor vehicles necessary to transport and maintain the army, will appear in next week's issue. The story and illustrations were furnished by Motor Age's European war correspondent at the front.

WANTED

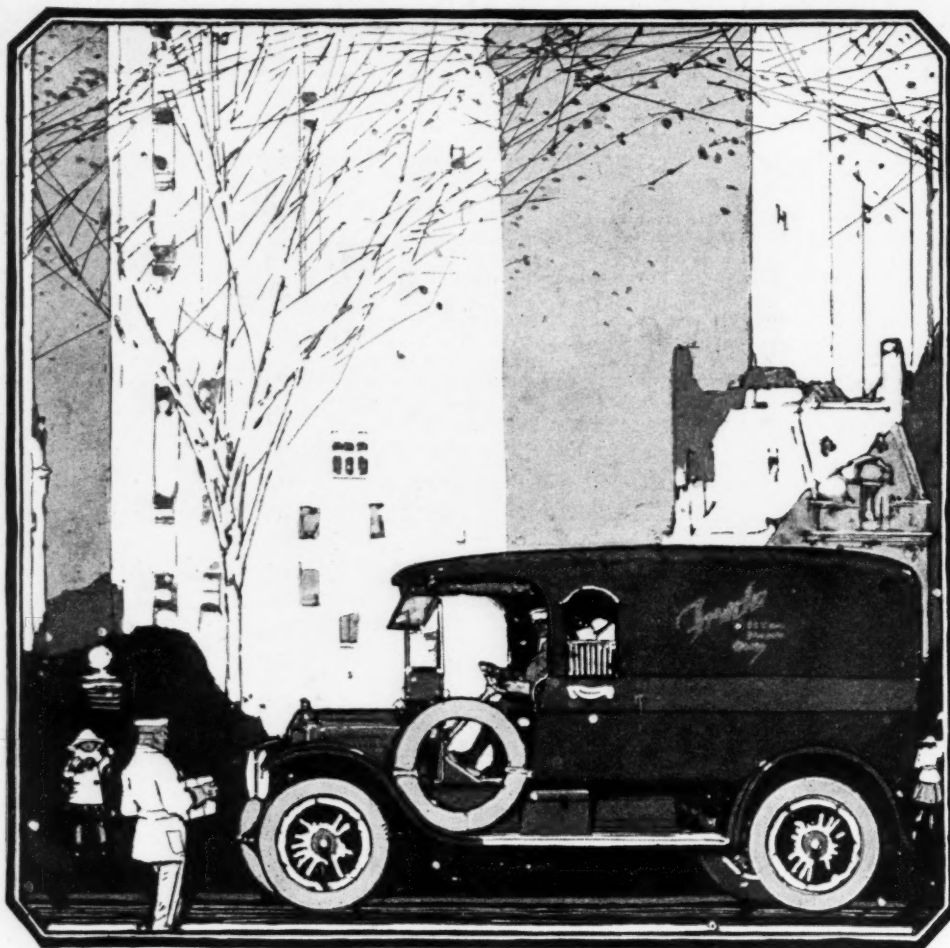
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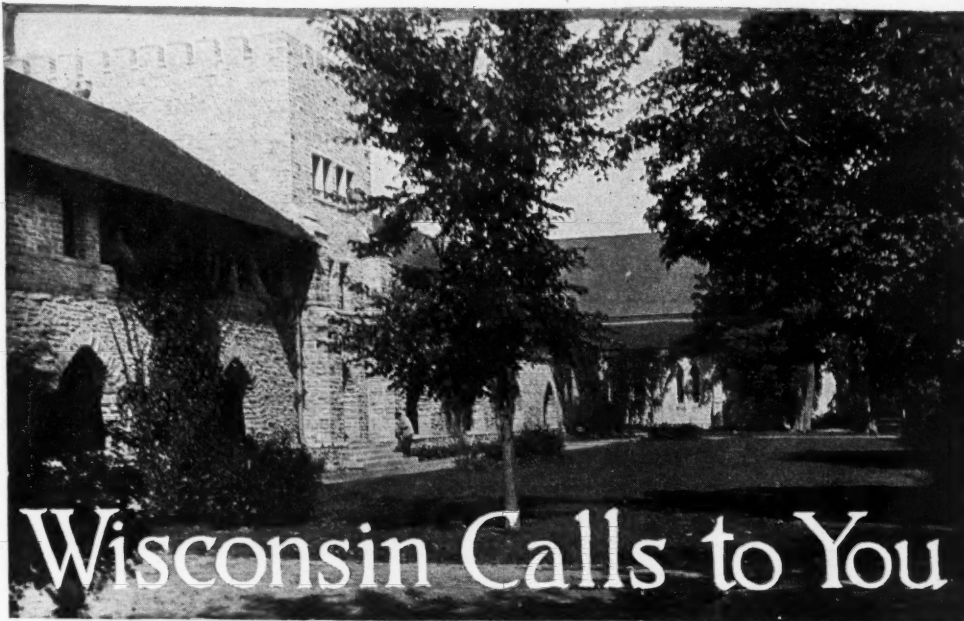
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IN building motor trucks it is the policy of The White Company to make them highest grade at whatever cost. This policy is founded on the conviction that nothing less sturdy, or less refined, or less expensive, can efficiently and economically meet the actual requirements of motor truck service.

THE WHITE COMPANY
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MOTOR AGE



Wisconsin Calls to You

Old Nashotah Mission, Nashotah, Wis., founded in the early forties

Waukesha County's Lakes Have Strong Appeal to Tourist—Holy Hill a Revelation

By William K. Gibbs

ACTING as advance agent for the vacation-tourist is fraught with almost as many vicissitudes as the life of that individual who slips quietly into town ahead of the thespians and arranges hotel and train accommodations for the troupe that will belittle his arrangements when it comes a few days later. If the hotel accommodations are not what the thespians decree that they should be; if the star has to take an upper berth in the Pullman when her contract specifically states a drawing room, then the advance agent finds his ears burning and occasionally gets an indignant letter of protest. But he is always a few laps ahead of the troupe and therefore takes the call more philosophically than he would were he obliged to listen to a verbal complaint.

I went into Wisconsin a few days ago as your advance agent and I tried to find for you every reason why you should choose the place I visited—Waukesha county—as the place to spend your

vacation, be it of only a few days' duration or cover a period of several weeks. I traveled with my eyes open, looking for details that I felt you would be interested in, and I came away with a feeling that if I had not already made my vacation plans, here would be the place I would want to come and motor, fish, swim, explore, eat regular home-cooked meals and breathe the fresh country ozone, and I am sure that when packing time came I would be loathe to leave this gently rolling country with its myriad lakes and streams, its charms and historical associations. For this is a region in which one can really take a vacation of lasting satisfaction.



Looking across Oconomowoc lake, the shores of which are occupied by palatial country homes and summer cottages



Bell tower of St. Michael at Nashotah Mission

You who seek the open, the great outdoors, can find satisfaction in this county with the Indian name. That you may locate it in your mind let me say it is about 60 miles north of Chicago and about 30 miles west of Milwaukee. It is easily reached by motor and once there you will find good, graded, gravel roads throughout the county. Do not expect to find roads laid out like city streets; that is, the kind that are straight and turn at right angles. The peculiar topography of this locality does not permit this form of roads. A large percentage of the county is taken up by a chain of lakes, all of which are easily accessible and around which there are many cottages and camping sites.

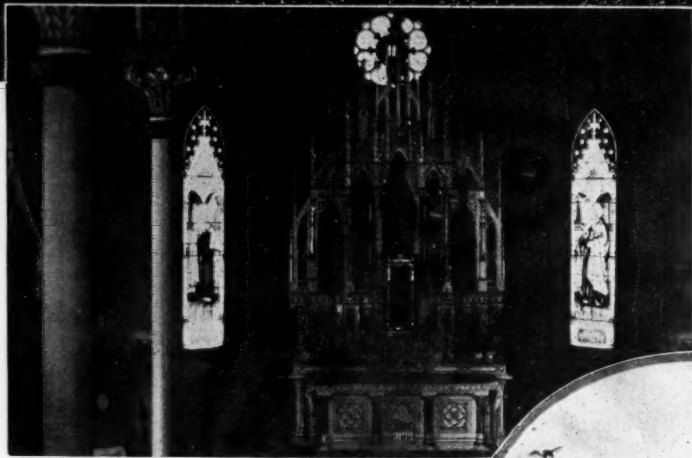
Two days, perhaps, will be sufficient for a rather complete tour of the lakes of Waukesha county. This chain of lakes, which is one of



Bird's-eye view of Waukesha county as seen from top of Holy Hill

the most attractive in the Badger state, or in the central west, includes some ten or twelve bodies of water of what might be termed major size, and numerous smaller bodies. Pewaukee lake is the largest, with Okauchee, Pine, Nagawicka, Lac La Belle and Oconomowoc next in line.

A good day's drive is to start from Pewaukee and following the south side of the lake by the same name, through Waukesha Beach and thence to Nagawicka lake and Delafield. Then you can drive north-west, going between Upper and Lower Nashotah lakes and skirt the west side



Altar of the church on Holy Hill

of Oconomowoc lake and thence to the town of Oconomowoc. This town is on



Detail map of Waukesha county, Wis., showing lakes, rivers, principal towns, roads and resorts



How church on Holy Hill looks from the road below

Lac La Belle, along the east side of which there is a very pretty drive. Turning and retracing the way as far as Oconomowoc you can then drive east and wind around between Okauchee and Pine lakes and take in North and Beaver lakes. This trip would approximate about 80 or 90 miles, so one would have plenty of time to make stops and visit the different places of interest enroute.

It matters not which road you choose, you will be well repaid, for they will take you through rolling country, as pleasing to the eye as any agricultural district of the central west and at frequent intervals you will glimpse refreshing bodies of water nestling between the hills. You come upon some new body of water when you least expect it and they make you want to stop and admire. I should say

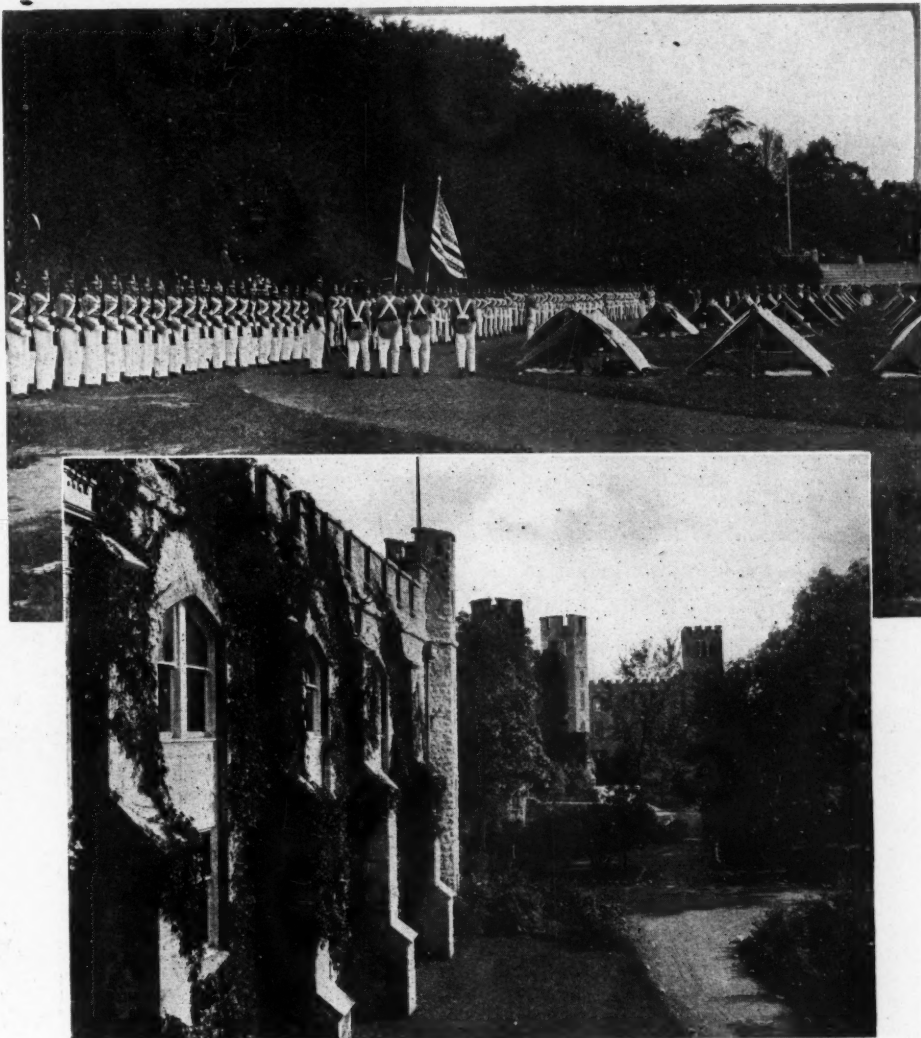
that Pine, Okauchee, Nagawicka and Pewaukee lakes were the most appealing from point of beauty. Almost without exception all of the lakes in the county have hotels and cottages which give good accommodations for the tourist.

Much has been done to make the roads in Waukesha county of the best possible. In all my tour of the county I did not find a stretch of highway that could be called bad. From the point of attractiveness I believe the drive north from Nashotah between Pine and Beaver lakes and up to North lake, then back between Moose and Okauchee lakes to the starting point to be the prettiest, although the road around Oconomowoc is very attractive.

Pleasant Objective for West

This county offers a pleasant objective for the tourist coming from the West to Chicago, providing he wants to spend a few days or a week end to enjoy some of the fine fishing and bathing that the lakes in Waukesha county have to offer. A good place to branch off, say the Lincoln highway, would be Dixon, Ill., going north to Rockford, thence to Harvard, Lake Geneva and on to Waukesha. This trip from Dixon would be a nice day's drive as the distance is about 150 miles. It is difficult to tell you what hotel to patronize; it all depends upon where you are when you want to stop for the night. The lakes are so close together and the hotels so plentiful that choice is difficult to make. This much you can depend upon; you'll find picking quarters an easy matter.

You will surely want to visit St. John's Military academy at Delafield, but reveille



Above—Cadets on dress parade at St. John's Military Academy, Delafield, Wis. Below—A view of the main academy building

will have been sounded while you probably are in the midst of some pleasant dream. Again, you may want to see as much of the days as possible and be up in time to hear

the soldiers' good morning call. It is at St. John's that many boys get their early training and prepare for college courses. Here among beautiful surroundings the cadets find time for study, recreation and sports. The school buildings are of limestone and the dormitories of cobblestone. You can spend an enjoyable half day here going through the various halls and if you are fortunate enough to time your visit to school terms you will undoubtedly see some very fine military drills.

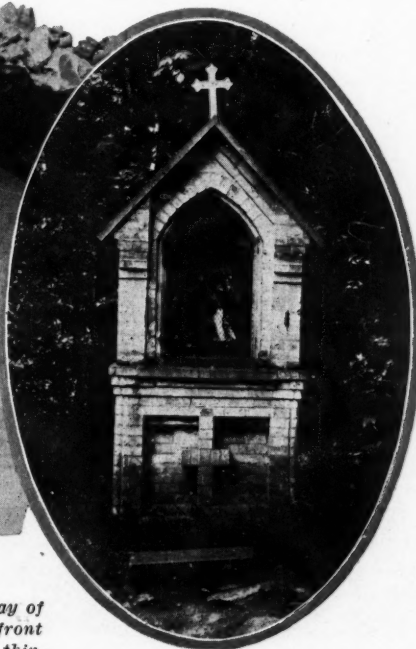
Finny Tribe Haunts There

The Wisconsin state fish hatcheries are at Delafield and offer an opportunity for studying the finny tribe if you desire. Leaving Delafield and going west and south you pass several of the Pabst stock farms on the way to Oconomowoc. Around the shores of Oconomowoc lake is a beautiful drive, but this is one of the exclusive bodies of water and there is little opportunity to camp or get cottages on this lake. In fact, nearly the entire shoreline of Oconomowoc lake is lined with country homes of millionaires, one typical of these being illustrated.

If you have ever driven from Detroit to Grosse Pointe, or up the north shore of Lake Michigan from Chicago, you can



Above—The grotto, or fourteenth station of the Way of the Cross, at the top of Holy Hill immediately in front of the church. In oval—Typical shrine or station, thirteen similar are found on path leading up the hill

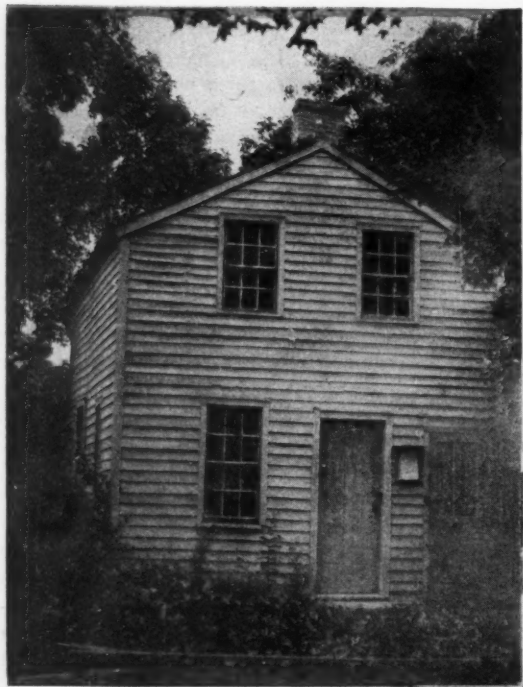




These two views show typical roads linking the various lakes together. On the left is the drive along the old Keck estate on Pine lake, and that on the right is of the road near Beaver lake



Wouldn't this be an ideal place for a game? This golf course belongs to the Chenequa Country Club, and is one of the most rolling links in the country



Above—Blue House at Nashotah Mission, the old lodge for the early pioneers
Right—Cross marking site of old chapel

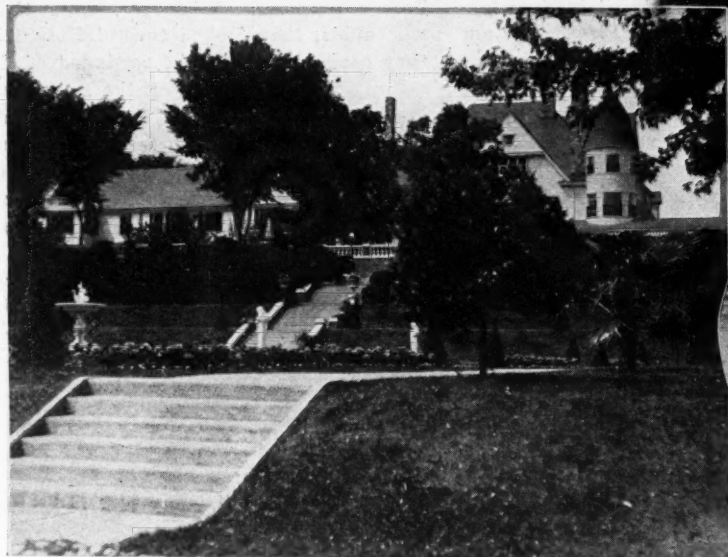
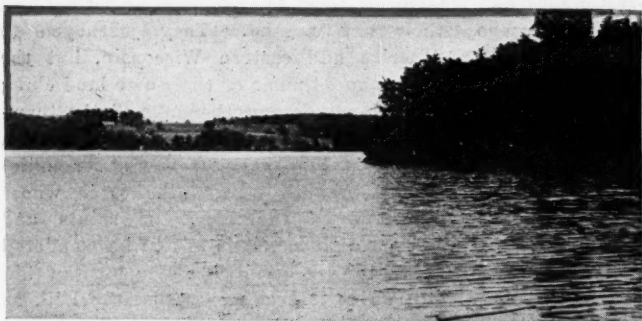


form comparison from some conception of the elaborate country estates on Oconomowoc lake.

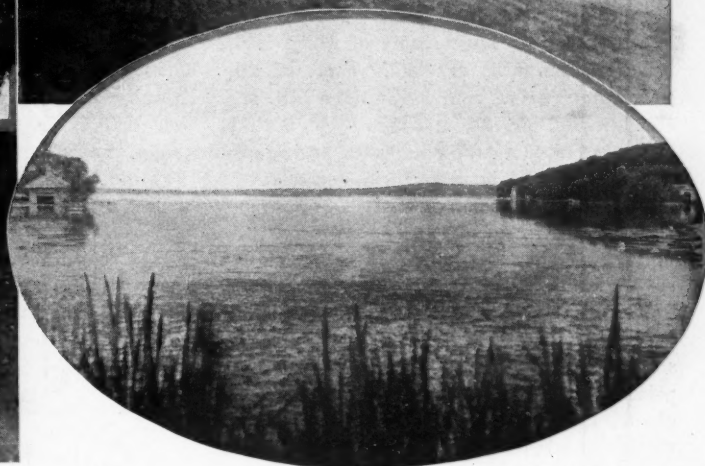
Nashotah House, known as "The Mission," is about 2 miles from Nashotah. The founding of this institution, which for 70 years has been a seminary of theological training, came back 1835, and is one of the results to be attributed to the great missionary impulse in the American church which was marked by the consecration of Jackson Kemper as bishop of the Northwest in that year. It was on his first return to New York after having explored his vast jurisdiction extending from Lake Superior to the Gulf of Mexico, that his story told to some young students, then soon to be ordained, led to their undertaking an associate mission in the then Far West, and beginning the work at Nashotah. Wisconsin was then a wilderness, Milwaukee a village and Chicago counted not more than 5,000 inhabitants. There were but two clergymen in all Wisconsin besides Bishop Kemper at that time. Though the three young deacons set out together, it is to James Lloyd Breck and William Adams that the credit belongs of actually founding the mission. A square mile of land was purchased from the Government and to this day is held intact. The Indian trail is still to be traced and close by it an excavation marks the site of the claim agent's cabin, where the first services were held. Most of the land remains in its natural wooded condition, a large portion of this timber skirting the two Nashotah lakes.

Old Landmarks Remain

Landmarks of the early days remain. Within a few yards of the library building stands the old Blue House, a small frame building, the original home of the associate mission. On it is a notation that "this is the first house erected on the mission grounds in 1842." The cerulean color originally given to it has left it the title by which it still is known. Mission-



Above is beautiful Beaver lake and below, the former Armour country home on Oconomowoc lake, this being typical of the homes in that vicinity



Above is a section of the drive around Oconomowoc lake, one of the prettiest in the county. Below is a view of Pine lake

aries and students used it as headquarters. At first it housed three clergymen, three young students and a boy. Before 1847 a number of buildings were built, these including a dining room, kitchen, store house, a low structure having eight single rooms and known as "Lazarus Row." The latter were coveted quarters and as the numbers increased even the wash house, ice house, basement, carpenter shop and hen house were used for sleeping quarters.

Close to Blue House is the old frame chapel, built during the early days of the Mission and used daily for services until 1859. Numerous other buildings later were constructed but in May, 1910, Lewis and Sabine Memorial halls were destroyed by fire. These have been rebuilt of the same limestone rock that was in the original buildings.

The main building has a long corridor-like promenade its entire length, this joining the side of the building while the outer side is a series of arches that makes one think of California or Spanish architecture. This corridor is 300 feet long. If you like to thumb musty old volumes the Francis Donaldson library at

the mission will afford you the opportunity. Here are many, many volumes that date back beyond the memory of most of the people living today. The architecture of this library is a beautiful specimen of the perpendicular Gothic. The library proper is on the second floor and here you will find one room 115 feet long and 25 feet wide. The window sills are 7 feet above the floor and under them are cases filled with books. The room is surmounted by an open-timbered roof and dominated at its western end by a lofty fireplace of cut stone, with its carved legend, "Sol Justitiae et Occidentum illustra—"

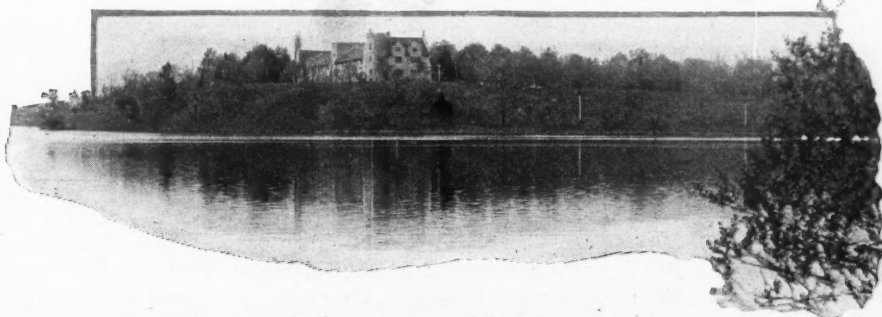
Pine Lake Drive Beautiful

A rustic bell tower in the grounds is used for the rising call for matins, even song and compline.

North of Nashotah the drive along Pine lake is one of the prettiest I saw. Here

the country road is lined with shrubbery that would do justice to the most elaborate city estate. Much of the property along the shore of Pine lake on the east side once was the summer home of the Kirks—makers of American Family soap. When it was sold it was found difficult to dispose of it in one parcel and so was divided and now has several owners instead of one.

Government Hill, which is in the southern part of the county, was once a government observatory. It is the highest point in the south end of Waukesha county and there is a good motor road reaching it. I might go on and tell you of many other features of this section, but I will leave a little to your imagination. However, you cannot go far wrong in choosing any spot on any lake for your visit here. If you will study the map you will find hotels, towns, roads, and much other information that will be valuable to you in making your selection of a vacation-land headquarters. It is seldom that an advance agent for the tourist-vacationer can recommend such a large number of places, all of which are good, but that seems to be my privilege and your gain



Nashotah Mission as seen across lower Nashotah lake

if you are going to the heart of Wisconsin this year.

Digressing for a moment, let me say that no trip to Waukesha county's lake region would be complete without a 5-mile drive to the north of Waukesha into Washington county. Here is what is known as Holy Hill, surmounted by a Catholic church which seems to stand as a sentinel keeping watch over all the country within a radius of 25 or 30 miles. A visit to Holy Hill is like studying a page torn from the history of the middle ages, because in this day and age you do not expect to find such a place.

Approach to Holy Hill

I do not want to appear sacrilegious, yet I want to convey to your mind some conception of how the summit of Holy Hill, and the church is reached. First of all, you cannot drive your car up the hill, for the laws of gravity specifically hold that a motor car loses traction when the grade becomes more than some 45 or 48 per cent. This hill rises 289 feet from its base to the summit and in climbing it I do not believe you travel more than 600 feet, surely not more than an eighth of a mile.

This pathway is called "Via Crucis," and leads through a dense forest which is still intact in all its original beauty and pristine grandeur. A deep and solemn gloom, even at mid-day, overshadows its whole length, causing a sense of silence and religious solitude to take possession of all who travel it. No effort is made to make the pathway easy for the many devout Catholics who travel it. In fact, were the grade made easier or the path less rough the very principle out of which it was conceived would be lost, for "Via Crucis," is designed to remind those who travel it of the sorrowful journey of Christ up Mount Calvary, bearing the cross on which he was crucified.

On the faces of none of those who make this pilgrimage at frequent intervals can you trace any mark of levity or mirth. Up this steep and rock-strewn pathway at intervals are the fourteen stations of the Way of the Cross. Once these were rough white oak poles on which were fastened pictures illustrative of the chief scenes of the passions of Christ. These have been replaced with small brick shrines in which are set bas reliefs, protected by wire screens. At the base of each shrine is a prie-dieu on which the pilgrims kneel and pray, or say penance. Up this hill go people of all classes and all ages. They come from all of the Middle West and little children as well as men and women whose years force them to spend the better part of a day to make the ascent, kneel before these shrines, some saying prayers only; others leaving offerings of flowers and keepsakes.

At the summit of the hill is the fourteenth station, built in the form of a grotto, and located directly in front of the church. Within, the church is not so very unlike any other Catholic edifice. On

the walls hangs discarded leg braces and crutches as testimonials from cripples who found no more use for them. The pilgrimages to Holy Hill each year rival the novena of St. Rita's in Chicago, where countless cripples are said to have been healed through the agencies of the wrist-bone of St. Rita.

I hope I may be pardoned this one point, but it seems so incongruous that anyone with an eye for the unusual could hardly refrain from mentioning it. Almost the first thing that greets the eye as one enters the church is a sign, printed in four languages, which reads: "Please do not write on the walls." This seems an unnecessary admonition to anyone going into a church. However, I imagine such a plea to be necessary, for the various stations, or shrines on the pathway up the hill are literally covered with the names of persons, who evidently never read the "fool's names, and fool's faces," couplet, or if they did, never heeded it.

Just a word as to the history of Holy Hill and we will go back to Waukesha county. In the early 40s great numbers of the Irish were forced into exile. Oppression, for religion's sake, made it impos-

sible for them to live, even as outcasts, in their native land. They journeyed to America and eastern Wisconsin, but the time-honored name of their own land clung in their minds and they named the township in which Holy Hill is situated, "Erin." The early settlers for miles around the hill were Catholics in whose veins flowed the blood of saints and martyrs. Hence, it is not to be wondered at that they should look upon the big hill, which later was named Holy Hill, as a spot set apart and to be reserved for religious purposes. Whenever, from their log cabins, they looked toward Holy Hill they could not fail to be reminded of the "Holly Hills of Erin," on the slopes and in the caverns of which their immediate ancestors were wont to assemble around an altar of rough wood, or the ledge of rock on which some outlawed priest offered mass for a persecuted and sorely distressed people.

The hill was purchased from the government in 1855, the first modest church has since been replaced by a larger one and this now is presided over by the Carmelite Fathers. There also is a monastery on the hillside.

Car Sales in Canada Show Increase

Gain Despite Higher Prices and Effect of War

OTTAWA, Ont., Can., July 27—The general increase in the expense of operating a car this year has not had the expected result of decreasing the number of cars in use in Ottawa. The situation is the very opposite to that which was freely forecasted, and according to statistics supplied by the license department branch of the police department there is an increase of close on 500 cars of all descriptions in use in the capital city. In 1915 the total number of motor car licenses issued was between 1,400 and 1,500. This year so far licenses have been issued for 1,800 touring cars and roadsters and 105 motor trucks. This makes a total of 1,955 licenses issued for motor vehicles exclusive of motorcycles since January 1st and by the end of the year the number will exceed that by a pretty fair figure at the rate of which licenses are being applied for at present writing. On January 1st there was a little change made in the system of licensing cars. Motor trucks were put in a class by themselves and in addition to a number on their license tags the letter C was placed on the tags alongside of the number. This distinguishes the tags used on touring cars and roadsters from those on motor trucks. There was also a new scale of license fees put into effect. By the new scale owners of small cars like the Ford, Briscoe and Chevrolet were obliged to pay \$10 for a license instead of \$6, which was the sum they had to pay by the old scale. On larger cars all licenses were increased

\$5. The maximum price for a license is now \$30. In 1915 the same license could be obtained for \$25. Along with this little increase in the expense of keeping a car the price of tires increased 25 per cent and gasoline has soared up to 32 and 35 cents per gallon. When it was announced last January that the license fees had been raised, there was some grumbling for a while but as license fees have only to be paid once a year motorists took the change for the most part cheerfully.

According to a recent report of the provincial secretary of Nova Scotia, 3,163 cars and other motor vehicles have been registered in the province since the act requiring the registration of such machines went into effect.

An analysis of the official figures showing the registrations of cars in Canada has just been made with interesting results by the Studebaker Corp. at Walkerville. In general the official figures for 1915 show a gain in all parts of Canada over the previous year. Taking nine of the representative centers the average increase was 23 per cent. The largest percentage of gain was in Vancouver, where the increase in 1915 was 44 per cent.

Victoria and Hamilton tied for second with gains of 34 per cent. Regina was next with an increase of 27 per cent. Toronto followed, producing a gain of 19 per cent. In number of cars registered, Toronto led with 8,815, as compared with 7,367 in 1914.

Ford Prices Are Reduced

Drop of \$80 in Touring Car Takes Effect August First

News of the Trade—Financial and Personal

DETROIT, Mich., July 31—New prices on Ford cars have been announced by the Ford Motor Co. which are a distinct reduction from the former prices.

The chassis is listed at \$325, the runabout at \$345, the touring car at \$360. This is a reduction of \$80 from the \$440 which has been the price of the touring car, and the price of the runabout is \$45 less than previously. New prices also are given on the coupelet, town car, and the sedan, these being \$505 for the coupelet, \$595 for the town car, and \$645 for the sedan. All prices are f. o. b. Detroit. The former price on the sedan was \$740, coupelet \$590 and the town car \$640, and chassis, \$360.

FRIEND UNITED MOTORS G. M.

Chicago, Ill., July 31—Otis C. Friend has resigned as sales manager of the Mitchell Motor Co., Racine, Wis., to become vice-president and general manager of the United Motors Co. He commenced his new duties in the New York City offices of the United Motors Co. the middle of August. Mr. Friend has been connected with the motor car industry for nearly a score of years, beginning with the Chicago sales of the old Locomobile steamer. He joined the sales forces of the Chicago Mitchell agency in 1900, then handled Mitchells as the firm of Brown & Friend in Milwaukee. Mr. Friend then became purchasing agent of the Mitchell-Lewis factory at Racine, and was successively assistant to J. W. Bate, then general superintendent of shops, later became assistant factory manager, assistant sales manager, and advertising manager. His successor at the Mitchell factory has not yet been appointed.

COLLINS G. M. C. DIRECTOR

Detroit, Mich., July 29—R. H. Collins, who resigned as sales manager of the Buick Motor Co. several months ago, has been elected a director of the General Motors Co., of which the Buick is a subsidiary. Mr. Collins takes the place of Thomas Neal, who was also a vice-president of the General Motors Co. and who withdrew because it is said he desires to give all his attention to the Signal-Commerce Motor Truck Co., of which he became the active head when the Signal and Commerce companies were merged.

REO FACTORY BRANCH IN CHICAGO

Chicago, July 31—The Reo Motor Car Co. has purchased the business of Owen & Buxton, Chicago Reo dealers, and will operate as the Reo Motor Car Co. of Illinois. Owen & Buxton have not made their plans

known, but it is understood they are considering a number of cars as agency propositions and may open with a new line in a new location.

SCRIPPS-BOOTH CORP. ORGANIZED

New York, July 29—Announcement is made by C. H. Booth, president of the Scripps-Booth Co., of the organization under the laws of the state of New York of the Scripps-Booth Corp., with a capitalization of 70,000 shares, no par value, of which 25,000 shares are to be offered for public subscription at \$50 per share.

The Scripps-Booth Corp. is a consolidation of the Scripps-Booth Co., Detroit, and the Sterling Motor Co., also of Detroit. The corporation will have no bonds or preferred stock and no floating indebtedness.

HALL LEAVES OLDS

Lansing, Mich., July 22—J. B. Hall, sales manager of the Olds Motor Works, this city, has resigned. Mr. Hall has conducted the selling of Oldsmobiles for a number of years. His future plans have not been announced, nor has his successor been appointed.

VER LINDEN OLDS G. M.

Lansing, Mich., Aug. 1—E. Ver Linden, factory manager and associate executive of the Olds Motor Works, has been created general manager of that concern, following the resignation last week of Jay Hall, his associate on the Olds executive committee.

With the appointment of Ver Linden the committee system of management at the Olds Motor Works is abolished, and the organization is once more under one-man control.

YEAR'S INCREASE IN G. M. SALES

Detroit, Mich., Aug. 1—Special Telegram—The General Motors Co. made and sold 121,113 motor cars during the first 11 months of its fiscal year which ended June 30. The sales for the similar period in 1915 were 68,604 cars. The gross sales to the end of June were approximately \$140,000,000 as compared with \$85,801,189 last year. There was approximately \$24,500,000 undivided profits for the common stock and cash on hand totalled nearly \$26,000,000.

STROMBERG STOCK TAKEN UP

New York, July 31—Books have been closed for the offering of stock in the Stromberg Carburetor Co. of America by Allan A. Ryan & Co. The 50,000 shares issued were offered at \$42 a share and the stock was heavily over-subscribed.

HEATERS FOR CHICAGO TAXIS

Chicago, July 28—The Perfection heater, manufactured by the Perfection-Spring Service Co., Cleveland, O., is to be part of the standard equipment on all the Shaw and the Yellow taxicabs in Chicago, and the factory is already making shipments at the rate of several hundred each month.

Spreading Federal Aid

How the Government Good-Roads Fund Is Distributed

State Apportionment for Next Year

WASHINGTON, D. C., July 29—The secretary of agriculture has certified to the secretary of the treasury and the governors and state highway departments of the several states the following apportionment of the \$5,000,000 of federal road funds available for the fiscal year ending June 30, 1917. This is the first installment of federal moneys to be apportioned to the states under the federal aid road act approved July 11, 1916.

Before making the division among the states the secretary, in accordance with the act, deducted 3 per cent or \$150,000 needed for administering its provisions. This left \$4,850,000 to be apportioned among the states, one-third in the ratio of area, one-third in the ratio of population, and one-third in the ratio of mileage of rural delivery routes and star routes. The apportionment on this basis gives the following amounts for the several states:

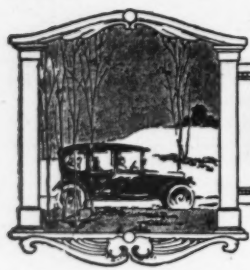
Alabama	\$ 104,148.90
Arizona	68,513.52
Arkansas	82,689.10
California	151,063.92
Colorado	83,690.14
Connecticut	31,090.44
Delaware	8,184.37
Florida	55,976.27
Georgia	134,329.48
Idaho	60,463.50
Illinois	220,926.23
Indiana	135,747.62
Iowa	146,175.60
Kansas	143,207.40
Kentucky	97,471.91
Louisiana	67,474.66
Maine	48,451.50
Maryland	44,047.22
Massachusetts	73,850.95
Michigan	145,783.72
Minnesota	142,394.06
Mississippi	88,905.84
Missouri	169,720.41
Montana	98,287.19
Nebraska	106,770.81
Nevada	64,398.30
New Hampshire	20,996.62
New Jersey	59,212.68
New Mexico	78,737.81
New York	250,720.27
North Carolina	114,381.92
North Dakota	76,143.06
Ohio	186,905.42
Oklahoma	115,139.00
Oregon	78,687.37
Pennsylvania	230,644.17
Rhode Island	11,665.71
South Carolina	71,807.64
South Dakota	80,946.02
Tennessee	114,153.48
Texas	291,927.81
Utah	56,950.15
Vermont	22,844.47
Virginia	99,660.71
Washington	71,884.28
West Virginia	53,270.46
Wisconsin	128,361.07
Wyoming	61,196.82

Total\$4,850,000.00

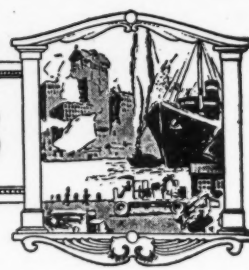
The apportionment indicated above is only of 1 year's funds. For succeeding fiscal years the act appropriates the following amounts:

1918	\$10,000,000
1919	15,000,000
1920	20,000,000
1921	25,000,000

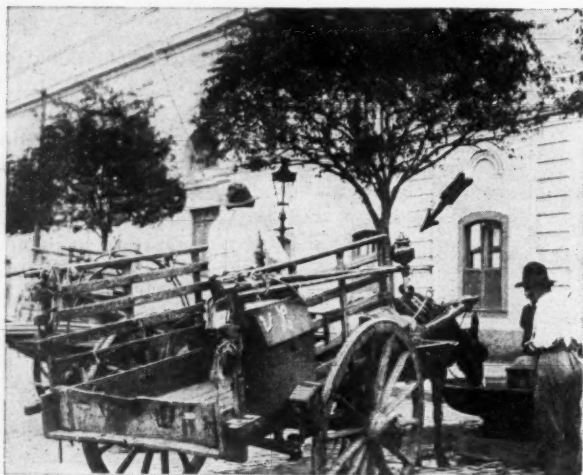
The act requires that the apportionment for each year shall be made in the same manner.



EDITORIAL PERSPECTIVES



Lights on All Vehicles



IT is unusual to publish an illustration on the editorial page of Motor Age, but the importance of the occasion warrants breaking an unwritten but acknowledged law. The photographic reproduction shows a typical horse cart in the city of Sao Paulo in the state of the same name, Brazil. Sao Paulo is near the heart of a great coffee country. The city is designated the "Chicago of Brazil." Today it has a little over 500,000 population, but it has its heart set on 1,000,000

in 10 years. Sao Paulo is perhaps the best handled state in Brazil. It is particularly progressive, and a high standard of business honesty pervades the entire state.

THE photograph was taken to show the oil lamp on the old type of cart. This is one of the poorest carts in the city, yet it must carry a light and the light must be lit if the cart is on the street at night. This law applies to every cart in Sao Paulo, and it applies to all kinds of horse vehicles as well as to the thousands of motor cars in the city.

HERE in Sao Paulo is an object lesson for our large cities of North America, where our horse-drawn vehicles still continue to go without lights at night, and where we still have accidents because of the non-enforcement of the law. What has been accomplished in Sao Paulo surely can be accomplished in our U. S. A. cities. We should have lights on all horse-drawn vehicles, not only for their own protection but for the protection of all vehicles using the streets and highways. There is no legitimate reason why the horse-drawn vehicle should not be compelled to carry lights, unless it may be that certain politicians are looking to their own selfish ends on election days by not working for the enforcement of such ordinances where they are at present on the statute books.

THE motorists are much stronger in the United States, numerically, than in Brazil, and as numbers are potent factors on election days, it seems as if a good, hard pull together is about all that is necessary to get necessary legislation of this nature enacted, and once enacted enforced. It will prove worth while. It is essential to the safety of motorists.

More Economy Needed

THESE are poor days even to suggest the old topic of economy with the country fat in many sections from the fruits of war orders and the general wave of prosperity being so generally felt. Notwithstanding the prosperity of today, it is well to keep an eye on tomorrow. Economy in cost of car operation is on the minds of quite a few motorists today and will continue to grow in importance with thousands of others. If gasoline continues at its present price level, fuel consumption will be a factor more considered than it has been heretofore. In other countries the prices are much higher. Australia has very high-priced fuel today, due to the war and ship shortage. There gasoline economy is a selling argument and the dealer must be able to show 25 to 30 miles per gallon on the imperial gallon, which is nearly one-sixth larger than the United States gallon. What is true regarding gasoline prices in Australia also is true with regard to South America, where the price is as high as 70 cents a gallon, United States gold, in the interior parts. When fuel reaches such levels it is high time to look to every quarter to practice economy.

THE looked-for economy naturally must come from the car manufacturer in the way of lighter cars and perhaps smaller and more efficient motors. Too few makers today are giving as much consideration to economy, as obtained by these two paths, as they should. It is important today that a car be as light as possible in order to meet the tasks of work it has to do. It is also important that a car have a motor sufficient for

all the emergencies that it will meet, but it is scarcely necessary to place so large a motor in the car that it can take the steepest hills on high. That is not economical engineering. The gearbox is for such exigencies, and if gasoline prices should continue to rise, gearsets will be used more.

MANY manufacturers should take up more seriously the reduction of weight wherever possible. This is highly important. Reduced weight means lower tire upkeep, lower fuel cost and generally less wear and tear on all car parts. For reasons unknown there is not enough attention given to this problem of weight reduction. With not a few makers this is perhaps due to the general use of assembled units, some of which may be over-size.

CUTTING out weight is not an easy task. It calls for very judicious pruning, here a little and there a little. Those makers producing nearly all of the parts entering into their cars naturally can have a free hand in this pruning process, but those building assembled cars can do their share, and the manufacturers of parts for assembled cars can aid in carrying the work through. Roads are improving each year, so that less motor power is needed. Grades are being cut down in many places. Roads are being straightened. In short, many improvements are taking place that tend towards greater car economy, but what the manufacturer can do must not be lost sight of. The question of car economy should be kept in mind in buying.

Be Calm, Joe, Be Calm!

Self-Dubbed Old Timer Gives Antidote for Cut-Out Nuisance

Says There Is No Place for Gunmen on the Road

IN a recent issue Motor Age gave currency to the trying tales of two persons, one who had devised an ingenious machine for impressing on the flagrant user of the cut-out that he is a nuisance, and the other, one Joe Stephenson, who had a bone to pick with those motorists who made him jump occasionally to keep from being run over. These two open letters were published in the July 20 issue. Now comes an open letter to Motor Age from J. W. Hayden, Cambridge, Wis., who tells Joe and the mysterious Mr. X that their methods are crude and advises that they buy "one of the gol darn things," and try to find solace in doing what they object to having others do to them, a sort of reverse English on the golden rule. Here in his letter:

"Editor Motor Age: An open letter to Joe Stephenson of Garner, Iowa, and the gentleman, 'Mr. X,' from 'Somewhere Around Minneapolis.'"

"Be calm, Joe, be calm! The world moves a little faster, Joe, than some of us old timers and we cannot quite keep up. Oh, we know what it is to dodge the motor car, Joe, and to listen to the open cut-out in the middle of the night, and we've raved to ourselves and swore, but

they don't seem to care, Jos, and we find that in the end it don't pay.

"We've hollered and yelled till our throats were sore, but they only sped merrily on.

We'd chase 'em if we could, if 'twould do any good, but the pesky things are so fast

That before you know it they're here and gone; they've got us lashed to the mast!

"And we've sat behind the faro tables on the western mining camps, Joe, and we know what's a Colt's forty-five, but they are a little bit out of date and we've laid ours carefully away where our children's children won't hurt themselves with it. So calm down, Joe, we haven't got long to live, and the only way I can see out of it is to get one of the gol darn things ourselves and tear around as long as we can.

—J. W. Hayden."

"CHICAGO CAPITAL OF DETROIT"

Some faint idea of how the foreigner regards Detroit can be conveyed by pursuing the following letter, which was received by the Export Department of the Detroit Motor Car Co., from a correspondent in Chile.

Detroit Motor Car Co., Export Department, Chicago, Detroit.

Dear Sirs: I have picture book of you of Detroit car 2,400 pesos at F. O. B. Chicago, capital city of Detroit.

I would lak to buy Detritt motor vehicle when can you name price oo me to this city of Valparaiso, Chile, South America.

Eduardo Rivas.

ALAS! POOR HORSE!

Lenox, Mass., July 28—H. R. Hinckley of Northampton drove a horse up to Curtis Hotel this week. This was the first arrival of a guest driving a horse in 5 years.

Rural Motor Vacations

Students of Farm Life Say Farmers Use Motor Car Now

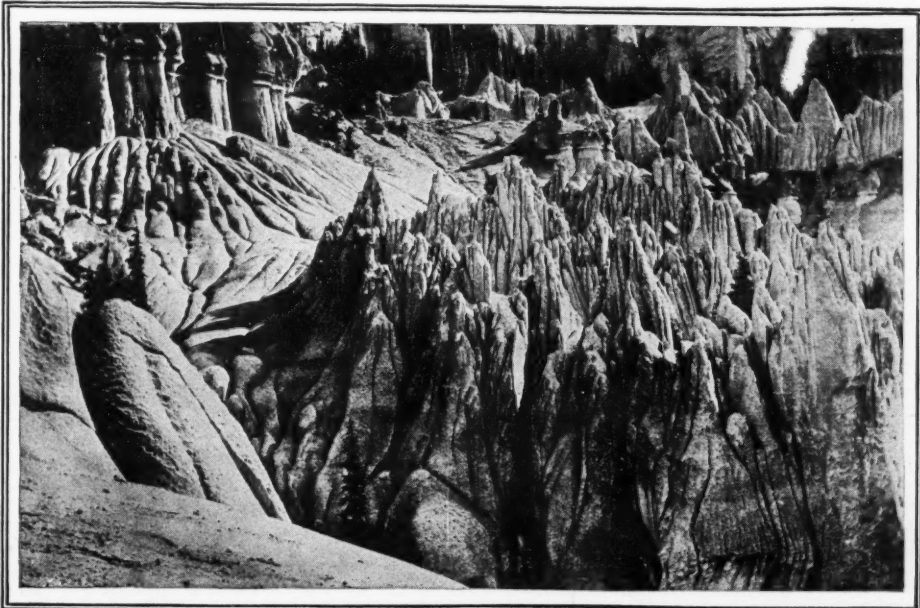
Summer Work on Farm no Longer Proves Hindrance

THE habit of summer vacations in the rural districts is being introduced by the motor car, according to students of farm life. The notion formerly was held that no time could be spared from summer toil for an outing. This was inevitable. The possession of a car naturally prompts journeys to points of interest. These farm vacations will not involve neglect of duties. They will be eventually outlined and arranged as a part of the year's business. Even upon a farm, it is possible to gain a few days through system and efficiency.

The farmer's vacation, of course, can not ignore the pressing demands of the planting season or of the harvest time. It is feasible, however, to indulge in a few days of recreation between harvest and haying, or between haying and threshing, or between threshing and corn-husking. Farmers and their wives do not need any great amount of commemoration, in contrast with city residents.

In many instances they are closely burdened with labors, but farm life has compensations as well as its trials. They are building better homes, have discovered the fascination of a summer vacation with the coming of the automobile, and no class of people has a better right to the pleasures and benefits of such an outing.

See America First — See America Now



EDITOR'S NOTE—This is the eighty-ninth of a series of illustrations and thumb-nail sketches of the scenic and historic wonders of America to be published in Motor Age for the purpose of calling the attention of motorists to the points of interest in their own country.

NO. 89—THE SHARK'S JAW

THE President has just signed a proclamation making a national monument of the Oregon caves or "marble halls" of Josephine county, in southern Oregon. The natural wonders are located in the Siskiyou national forest about 30 miles south of Grant's pass in Cave mountain. The caves are in marble and other limestones and consist of innumerable caverns, corridors and passageways of various sizes, all of them decorated beyond description in crystalized carbonates. Many are unexplored.

Marmon 34 Lowers Coast-to-Coast Mark

Stevens, of Motor Reserve, Carries Message from
New York to Frisco in 5 Days 18½ Hours

SAN FRANCISCO, Cal., July 29—S. B. Stevens, of Rome, N. Y., chairman of the Motor Reserve Division of the American Defense Society finished a record-breaking trans-continental run in his Marmon car here at 5 p. m. this evening. He left Columbus Circle, New York, 3,476 miles away, at 1:30 a. m. Monday, July 24 and completed the trip in 5 days, 15 hours and 30 minutes, allowing for the 3-hour loss due to difference in time. This is 41½ hours lower than the previous coast-to-coast record made on a trip of 3,371 miles from Los Angeles to New York in May of this year by E. G. Baker in a Cadillac eight. The object of Mr. Stevens' trip was to demonstrate the value of good roads in quick mobilization. The car was a Marmon stock job and is the privately-owned vehicle of Mr. Stevens, although the co-operation of the Nordyke & Marmon organization was afforded the car and drivers on the trip across the country.

The speed at which the car travelled may be judged from the fact that although it left New York at 1:30 a. m., it had arrived in Buffalo at 2:50 p. m. on the same day having travelled the 450.4 miles at more than 33 m.p.h. average. The car was in South Bend at 4:10 a. m. the second day and arrived at Merrillville, its nearest point to Chicago, at 7 a. m. the second day having covered the 993 miles by the northern route in 30 hours and 30 minutes. The car arrived at Omaha at 1:10 a. m. on the third day, Cheyenne at 4:50 p. m. on the third day, Salt Lake City, 7:40 p. m. on the fourth day and Reno, 5:30 a. m. on the fifth day.

Five drivers divided the time with the greater part of the distance being driven

by Mr. Stevens. The other drivers were Walter Bieling, Robert Creighton, Wm. Binz and Fred Barbour. A message was carried from Major General Wood, commanding the department of the east to Major General Murray, commanding the department of the west.

A distance of 3,390 miles was covered in the journey at an average speed of 25.1 m.p.h. The car used was a Marmon model 34 touring car of regular production, the only change being the removal of the tonneau and the placing of an auxiliary gas tank so that there would be plenty of fuel in the long run across the desert. Before the trip was started, a schedule was laid out like that of a railroad timetable. This was closely adhered to until road irregularities were encountered towards the end of the trip. The car left Rawlins, Wyo., 35 minutes behind schedule on account of muddy roads. The roads between Evans-ton and Salt Lake City were in bad condition and a wire from Salt Lake reported that a torque rod socket had been broken in Parleys Canon, 16 miles from Salt Lake City. Repairs were soon made, however, and Bieling left with the car at 7:40 p. m. from Salt Lake City on July 27. Rain and washouts delayed the car just before entering Ely and due to poor roads a broken wheel resulted along the same stretch. Due to the misguiding of a pilot 3 hours were lost on the desert. From that time on, everything went smoothly.

The trustees of the American Defense Society were keenly interested in the experiment and as chairman of the Motor Reserve Division Committee Mr. Stevens made the test directly under the auspices of this society. The drivers were under

instruction not to exceed 50 m.p.h. at any time and the fact that the high average was maintained under these instructions gives a remarkable demonstration of regularity over the trans-continental route.

The route chosen was over the New York state roads from New York to Albany, thence across northern Ohio and Indiana to near South Bend, where the journey continued over the Lincoln Highway to San Francisco, this route being followed with the exception of a few detours, and cut-offs. The Automobile Club of America inspected the car and placed various seals upon the motor and other parts before the run started.

TRADE WINS BANTA TROPHY

Chicago, July 31—In the reliability run of the Chicago Motor Club for the Banta trophy, Saturday and Sunday, the team of twenty cars representing the motor car trade won from the thirteen cars of the amateurs. The total score was 235 penalties for the traders and 322 for the amateurs. The run was to Bass Lake, Ind., and return.

SCORE ENTER TACOMA

Tacoma, Wash., July 28—While there is still more than a week in which to make entries in the Montamarathon and Golden Potlatch trophy 300-mile race to be held on the Tacoma speedway August 5, indications point to a field of more than twenty starters. Secretary George Dunn has announced the following signed entrants:

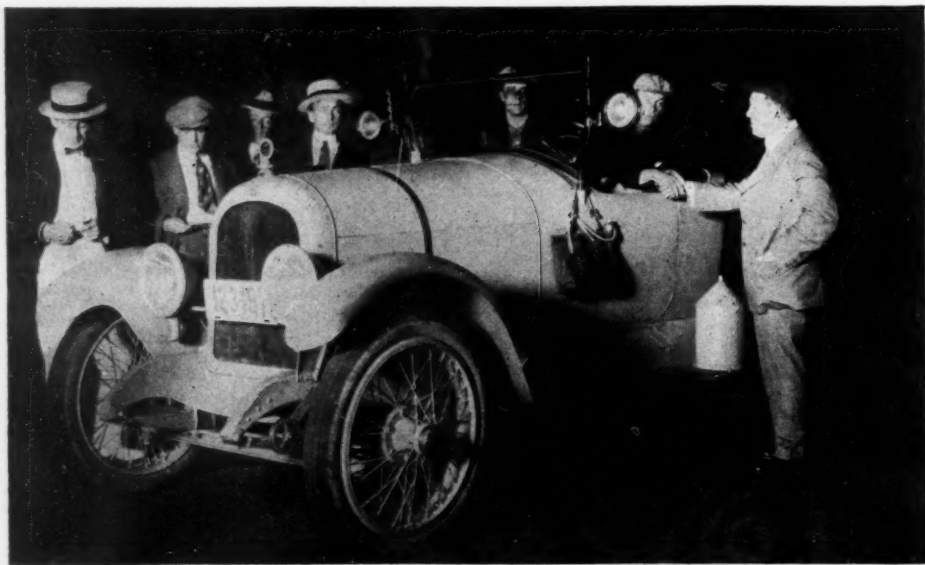
DRIVERS	CAR
De Palma.....	Mercedes
Henderson.....	Maxwell
Chandler.....	Crawford
Rawlings.....	West Duluth Special
Moore.....	Pusen
Barsby.....	Hudson Special
Milton.....	Duesenberg
Franchi.....	Delage
Unnamed.....	Gandy Special
De Alene.....	Duesenberg
Rickenbacher.....	Maxwell
De Vigne.....	Delage
Lewis.....	Crawford
Sorenson.....	Morse
Taft.....	Omar
Johnson.....	Crawford
Unnamed.....	Gandy Special
O'Donnell.....	Hoskins Special
Price.....	Gandy Special

MASTER TITLE FOR COAST RACE

San Bernardino, Cal., July 29—A movement has been started among road race followers to have the proposed Los Angeles to Salt Lake race, to be held in October, carry the diamond medal and title of Master Driver of the World. This medal and title formerly went to the winner of the Los Angeles to Phoenix race and is now held by Barney Oldfield. Since Barney has announced his retirement it is believed that he will pass the title and trophy to the winner of the next desert classic.

INDIANAPOLIS RACE SEPT. 9

Indianapolis, Ind., July 28—The Labor day date for the Harvest racing classic has been presented to a rival track by the Indianapolis motor speedway officials, and Indianapolis moves its date forward to September 9. On this date three different



Start of record-breaking Marmon 34. F. E. Muskovic wishes S. B. Stevens godspeed at New York on his run to San Francisco

events will be staged, all for non-stock cars of 300 cubic inches piston displacement or less, and a maximum weight of 2,500 pounds. This makes the Indianapolis contest calendar complete, with the famous international classic in May, and now at the end of the season, three shorter events.

The first event is 20 miles for a \$1,000 purse; second, 50 miles for \$2,000 purse, and third, 100 miles for \$9,000 purse. Entry blanks have been mailed to racing car owners throughout the country and the event will, no doubt, attract all the popular cars and drivers. A schedule of popular prices has been arranged.

If Cincinnati gets her speedway under way in time to hold her race Labor day, September 4, this event will attract, it is said, all of the best motor racing talent because it will be the initiation of the Ohio oval. This track, being only 3 hours' ride from Indianapolis, means that the majority of the drivers and cars at Cincinnati will go to Indianapolis for the Harvest classic.

In event Cincinnati does not get ready in time the Indianapolis people have permission from the American Automobile Association to use the Labor day, September 4, date.

STOCK MERCER FOR VANDERBILT

Santa Monica, Cal., July 26—There are five signed entries in already for the Vanderbilt Cup and Grand Prize races to be held on the Santa Monica course Nov. 16 and 18. These are five Mercers.

Three of the drivers have been nominated—Eddie Pullen, Glover Ruckstell and Joe Thomas. It is rumored that Tony Jannette and Teddy Tetzlaff, who are both proprietors of garages in Los Angeles now, will be the other Mercer drivers.

One of the Mercer entries is to be a stock model, registered with the A. A. A. and entered solely to show what a stock model will do. It has been announced that the car will be entered with fenders, windshield and top, if the contest board will allow it; but it is hardly probable that this equipment will be allowed. It is believed that after the car is registered as a stock model, permission will be granted for the removal of the fenders, top and windshield for the safety of drivers and spectators.

Barney Oldfield stated that he would enter and drive his Delage car in the Vanderbilt and Grand Prize events on the Santa Monica course Nov. 16 and 18. Although the veteran announced his retirement while in the East, he had promised to drive at Santa Monica if the Chamber of Commerce of that city secured the two classics for 1916 and he says that he will keep his word and then quit for all time.

Earl Cooper, who returned to southern California last week, has announced that he will also be an entrant and contestant in the Santa Monica races, driving his Stutz.

Pike's Peak Climb Attracts Big Field

Famous Drivers to Race up Mountain—Oldfield, Mulford and Hughes Among 35 Entries

COLORADO SPRINGS, Col., Aug. 1—Special telegram—One of the largest lists of entries ever gotten together for a hill climb has been received for the Pike's Peak classic that will be run August 11 and 12. Among the stars who will participate in the events, the major one of which will be for the Spencer Penrose trophy and \$3,000 in cash, are Ralph Mulford, Barney Oldfield, Hughes and Whalen.

Following is the list of entries to date, and as the closing time has been extended to August 5, several more are expected:

Event No. 1—231 cubic inches and under:	Entrant
Car	
Detroit Special.....	Not named
Event No. 2—300 cubic inches and under:	Entrant
Car	
Wisconsin Special.....	James Weir
Detroit Special.....	Not named
Duesenberg.....	Hughie Hughes
Hudson super-six.....	Ralph Mulford
Milac Special.....	Neil Whalen
Peugeot.....	Ralph Mulford
Stutz.....	Gustave Davary
Hudson super-six.....	A. H. Patterson
Delage.....	Barney Oldfield
Duesenberg Special.....	Hughes
Case.....	J. E. Fairbanks
Packard.....	C. W. Johnson
Stutz.....	Gustave Duaray
Peerless.....	Not named
Giddings Special.....	I. P. Federman
Stutz.....	F. W. Dickinson
Buick.....	Not named
Romano.....	Rea Lentz
Maxwell Special.....	Not named
Ford Special.....	Guy Peterson
Ford Special.....	Walt Henry
Pathfinder Special.....	A. Hughson
Event No. 3—Free-for-all, trophy and \$3,000 in cash:	Entrant
Car	
Detroit Special.....	Not named
Buick.....	M. McCoy
Cadillac.....	H. S. Brinker
Briscoe Special.....	Roy Tangye
Ford.....	Isadore Spangler

Studebaker.....	C. C. Morgan
Pathfinder.....	R. C. Mulnix
Ford Special.....	K. E. H. Knowles
Ford.....	Guy Peterson
Peugeot.....	Bennett Hill
Hudson super-six.....	Mulford
Hudson super-six.....	A. H. Peterson

All cars are specials under the ruling of the American Automobile Association code for non-stock events.

DE PALMA HAS NEW RACER

Chicago, July 30—Ralph de Palma made the first two entries for the Speedway grand prix race, to be run at Maywood Aug. 19. One of his entries is the Mercedes that he has been campaigning this season. The other is a new mount that he has been working on in Detroit.

In filing the entries de Palma refused to disclose the identity of the driver that he has selected as his teammate, and also was reticent about discussing the mechanical details of his new car. He intimated, however, that the car is similar in design to the Mercedes, and it is reported that it will carry an aviation motor made by the Packard company.

TO RESURFACE ASCOT

Los Angeles, Cal., July 27—The contract for resurfacing the Ascot Speedway of this city was let by George R. Bentel, manager of the course, through his superintendent yesterday. The work is to be completed by Nov. 1 and the next meet on the Ascot speed trial is scheduled for Thanksgiving.



One of the effects of Gotham's \$7,000,000 explosion Monday. Motor cars stored in warehouses for export blown hundreds of yards

Stations on Highways

Roadside Stopping Places for Traveling Motorists

Organizations Campaigning for Comfort of Long-Distance Tourists

NEW YORK, July 31—Under what is called "The American Plan," a nation-wide campaign has just been launched by the Public Comfort Station Bureau backed by the American Automobile Association, National Highways Association, National Old Trails Road Association, and other national organizations, to provide roadside stations in cities along all highways like passenger stations along the right of way of a railway.

The plan was called forth by the urgent need for public comfort stations, and the almost criminal lack of them in this country, which is far behind Europe in that respect.

The several national associations coöperating in this campaign purpose using their joint influence to have erected in every city through which a main highway runs, one or more public comfort stations, provided with a comfortable waiting room, equipped with sanitary toilet accommodations for men and women, containing pure and wholesome drinking water and in hard-water localities having a small water-softening apparatus for supplying soft water for car radiators. The stations are to be equipped with telephones so that, wherever located, the traveler will always be in touch with the outside world. Other necessary electrical equipment will likewise be provided. The waiting room can be used, too, as an emergency hospital in case of accidents along the road, while telephones connecting the various stations along the line will tend to prevent crime or check the escape of those engaged in criminal practices along the highways.

In the western part of the country, where cities are rather far apart, they plan to have counties or townships put up community buildings along the lines of travel, containing auditoriums where lectures can be delivered, moving picture or other entertainments given, libraries housed, halls where dances can be held and rural companies of state militia or national guards organized, drilled and quartered.

Aviation, likewise, comes in for consideration in this comprehensive plan. It is estimated that within 10 years aeroplanes will become almost as numerous as motor cars are today, so at certain roadside stations, or public comfort stations, landing places will be provided, parking places, and a system of land lights, so that an aviator at night will know what state he is over, and the location in the state.

So that all the features of value in war times will be incorporated in the build-

ings, the war department has detailed Major Carl F. Hartmann to coöperate in the work.

To build a public comfort station such as this plan calls for, will cost approximately \$10,000. For the small towns and cities a less expensive building is contemplated, but which contains all of the elements found necessary to make a station safe and sanitary. By the clever working out of this plan these stations will be not only self-supporting, but will pay for the cost of construction within 10 years.

GASOLINE AND OIL DROPS

New York, July 31—Standard Oil Co. of New Jersey has reduced gasoline prices 1 cent a gallon in New Jersey to 22 cents, tank wagon basis. In Findlay, Ohio, the Ohio Coal Co. yesterday marked down eight grades of oil 10 cents per barrel, and it is predicted that other reductions will follow. The large production of oil in many sections of the country is partly responsible for the lower prices which are North and South Lima, \$1.63; Indiana, \$1.48; Wooster, \$1.90; Princeton and Illinois, \$1.72; Plymouth, \$1.58.

FIGHT IN GAS SUBSTITUTE

Columbus, Ohio, July 28—In a suit for violation of contract, Clarence W. Miller has made charges against the Union Oil and Grease Co., and Grant C. Holliday and Warren C. Miller, claiming that the product known as "Karoline," a substitute for gasoline, is simply kerosene with a small percentage of gasoline added. The plaintiff claimed that the company demanded \$200 from him for a certain territory and he was to receive \$20 weekly as local sales manager. He worked for some time but found his customers complaining of the product and thus he had an analysis made. He asks for \$422 damages.

FIGHT FUEL DELIVERY BILL

St. Louis, Mo., July 29—Small dealers in gasoline are bringing pressure to bear on Mayor Kiel to have him veto the bill passed by the board of aldermen last week forbidding the delivery of more than 3 gallons of gasoline to a motor at any place except a filling station. Paul Browne of the Independent Oil Co., who is spokesman for the small dealers, declares that the bill was introduced on behalf of the Pierce Oil Corp., which owns twenty-five of the 100 filling stations in the city.

UNCLE SAM PAYS 23 CENTS

Washington, D. C., July 15—A contract has been awarded the Columbia Oil Co., Roslyn, Va., to furnish the annual supply of gasoline for delivery at the various army posts in the vicinity of Washington, for the fiscal year ending June 30, 1917, at a price of 23.5 cents per gallon.

Law Angers Motorists

California Highway Commission Rules Against Road Signs

Taboo All Road Guides Upon Which Advertising Is Evident Club Signs Excepted

SACRAMENTO, Cal., July 28—Motorists throughout the state are up in arms over the decision of the state highway commission against the road signs placed along the California highways by the B. F. Goodrich Co.

At the last session of the state legislature a bill was slipped through giving the highway commission power to remove or have removed, all signs along the public highways of the state, bearing advertising. The law gives the highway commission the right, however, to make exceptions, and this is the point over which a great fight is promised.

The Goodrich representatives have been instructed to remove all its signs in California although these are of great benefit to motorists in many sections. The company has been given until December 1 to remove these road signs, but some organization, seemingly, is already removing the signs. At least the road signs of the Goodrich company are disappearing, especially in southern California. An effort is being made to find who is doing this.

The motor clubs which have placed signs are exempt from the ruling of the highway commission although the club's signs bear advertising in every case. The California State Automobile Association, with headquarters at San Francisco, which is affiliated with the A. A. A., has indorsed the work of the Goodrich sign-posting service and officials of the A. A. A. have been warm in their praise of the signing system employed by the Goodrich company in California.

In southern California, the Automobile Club of Southern California, which is not affiliated with the A. A. A., has worked against the Goodrich signs and it is claimed that it was largely due to the influences of the club located in Los Angeles that the highway commission ruled against the tire company's signs. No reason is known for the action of this organization.

ARMY TESTS KING WAR CAR

Washington, D. C., Aug. 1—Special telegram—Officials of the army and marine corps started tests here today on a light armored motor car on an eight-cylinder King chassis. The car, weighing 4,600 pounds with a crew of three men including driver, was given hill and gully tests today. The car was sent up a stiff cobblestone grade in Georgetown and a washed-out hill on the Fort Meyer reservation. The car was then given cross-country tests at Fort Myer which included the crossing of a 5-foot gully.

Delegation of Detroiters Tour the East Shore of Lake Huron

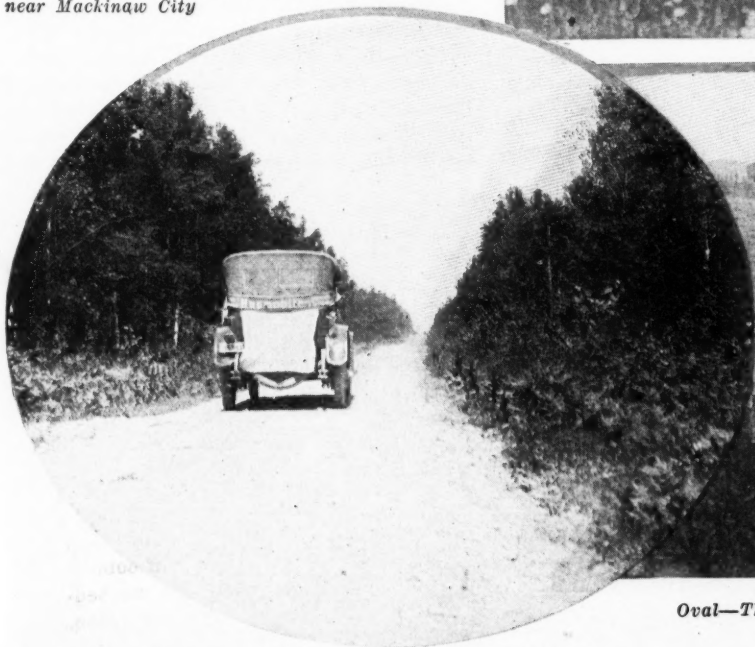
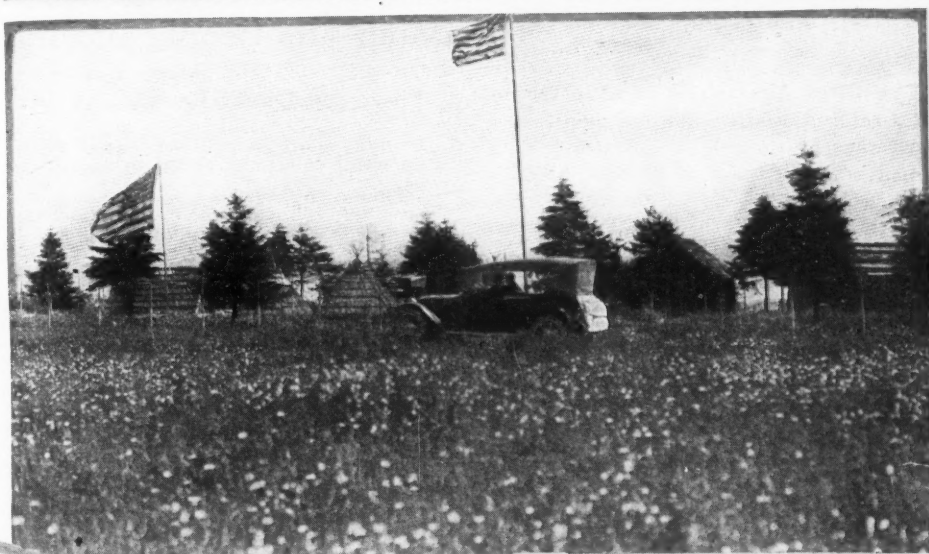
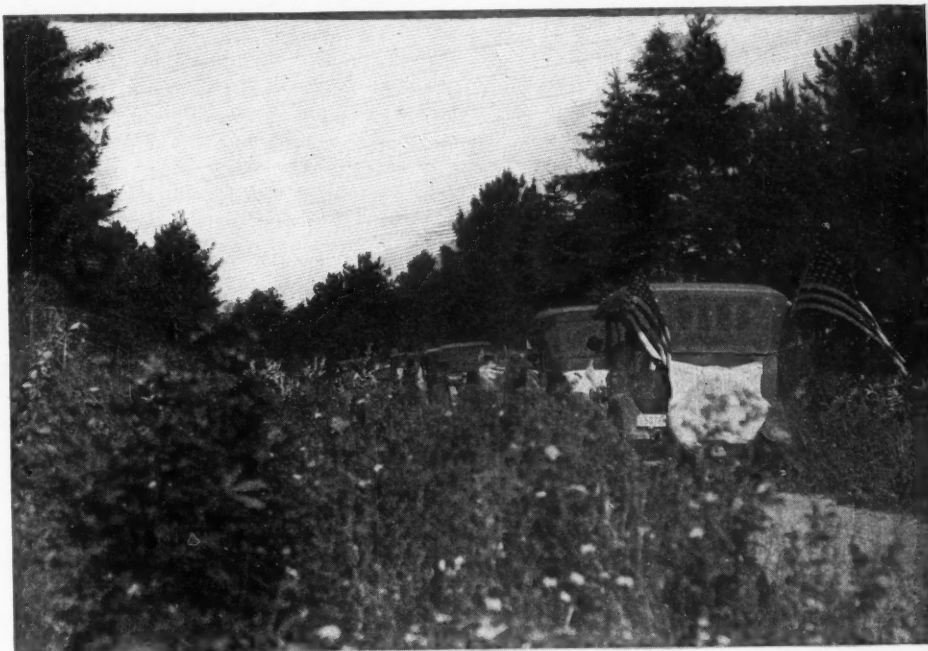
Meet Chicago Tourists at Mackinaw City, Where Statue Is Unveiled

THE good roads cause in Michigan received a big boost recently when, headed by W. E. Metzger, chairman of the good roads committee of the Detroit Board of Commerce, a big delegation of good roads enthusiasts from Detroit and vicinity and prominent figures in highway improvement work of the state and nation made a tour from Detroit north to Mackinaw, following the east shore of Lake Huron. At the same time a band left Chicago to tour up the west side of Michigan, and the two parties met at Mackinaw City. The main object of the tour was to stir up enthusiasm for a thoroughly improved roadway up each side of the Wolverine state.

About twenty-five motor cars carried the seventy-five tourists, and the route followed from Detroit was over the so-called East Michigan pike. Addresses by roads men of note were delivered at some thirty towns along the way, and everywhere the travelers were met with the greatest enthusiasm.

Mackinaw is 377 miles north of Detroit, and an improved highway would mean much to the state. The climax of the two runs that joined at Mackinaw was the unveiling of a monument to good roads and development, this northern village marking the apex of the Dixie highway as well as the northerly end of the proposed east and west Michigan pikes. Motor Age of July 27 pictures the monument.

Above—Narrow lane near Mackinaw City. Right—Tepee village of the Chippewa Indians near Mackinaw City



Oval—Through the pine woods of western Michigan. Above—Corduroy roads near Omer

The Face of the Argentine



The face of the Argentine—Over the pampas are millions of cattle. From the railroad train window you often see the land dotted with cattle as far as the eye can see in every direction. The cattle are like corn shocks in Illinois. Moving in and out in the numberless herds are the gauchos (gow-chows), the most picturesque figures on the pampas. They are the cowboys of Argentine. By day they live in their saddle and at night sleep on the pampas with nothing but the sheepskin which forms the saddle for a pillow and bed and nothing over them but the poncho. Poncho is a garment local to South America. It is a huge cape with a center hole, allowing it to slip over your head. When on, it hangs over the horse and protects him from the shoulder to the tail. The poncho is waterproof and warm. Generally made in grays and blacks, it is not conspicuous and serves as well for a blanket at night as it does for an overcoat by day.

The Camp—Its People and Its Trails

By David Beecroft

Editor's Note—This is the second of a series of articles on South America by David Beecroft, managing editor of Motor Age, who has just completed a lengthy trip through the Argentine, Uruguay and southern Brazil. In the preceding article, published in Motor Age issue of July 27, the author gave general conceptions of South America, a land too little understood in the United States.

BUENOS Aires, June 23—The face of rural Argentine has one appearance, and that of rural United States has another. The agricultural panorama seen in one is the antithesis of the other. The agricultural face of the U. S. A. is the face of today; the face of agricultural Argentine, "the camp," as it is called, is the face of yesterday. The Argentine camp travels years behind life in Buenos Aires in the procession of civilization, industrial progress and education. It is almost difficult to comprehend how so great a city as Buenos Aires with nearly 2,000,000 population has risen the great colossus in the region known as the River Plate section,

a territory that outrivals in commerce the great valley of the Amazon, and yet how the endless plains reaching to the Andes on the west and Straits of Magellan on the south have lagged so far behind in education and in those arts that measure

the slow step-by-step progress of a race.

In the U. S. A. the farmer is keeping step in step with the city in the evolution of the country. The rural telephone is in millions of homes in the Mississippi valley; the daily papers from the rotary presses of our hundred cities reach the millions of farmers the same day; our rural free delivery system carries the letters and business correspondence of the city office to the cross road store with as great regularity as our limited trains transport the mail sacks from New York to Chicago. Our telegraph system keeps every hamlet in the news ranks with our largest cities. In the U. S. A. the country and the city walk arm in arm. The measure of progress in one is reflected in the other. It is not a land of extremes, but a land of high averages. The wealth does not all center in the cities; rather the farmer has been the great purchaser of motor cars for the last 5 years, a criterion of his wealth.

A Land of Extremes

Rural Argentine is different. It is a land of extremes. Here in the camp you find the fabulously rich and the miserably poor. Here you find the palatial mansion, more palatial than anything you can find scattered up or down our Mississippi or Ohio valleys, and around it you find the thousands of mud huts, the like of which the eye searches for in vain across the limits of Kansas, in western Nebraska, or along the outposts of Oklahoma.

The U. S. A. has in reality one class of farmers; Argentine has two. Here in the camp the eye meets two distinct kinds, the ultra rich and the ultra poor. The ultra rich owns lands, leagues in extent. The ultra poor rarely owns land; he rents it



Home of the estanciaero in the country camp and, on the opposite page, the grounds around his palatial home. These wealthy homes are scattered all through the country. They may be 30 miles apart, they may be 60



The face of Argentine—A glimpse of the country, or camp, as seen in the province of Buenos Aires. In a day's railroad trip you see hundreds of views of this type. It is a level pampas with plenty of water in many places and in need of irrigation in others. As far as the eye can see is an ocean of land, often as level as the picture for 100 miles and only occasionally relieved by a low bluff along a stream and also by the clumps of trees that generally follow the rivers

for a term of years, gets a scant living from it and then moves to some other section, where he rents again, often hoping against hope to become a home owner as we know it in the U. S. A.

Rural Argentine has been settled by the landed property system as opposed to the individual farmer system in North America. Under the landed property system a land owner does not measure his land in acres as we do; he may speak of it in hectares—a hectare is practically 2.5 acres—but he generally speaks of it in leagues. From school days we remember the league as equaling 3 miles. With the Argentine farmer it is the square league, a square of country 3 miles to the side, comprising 9 square miles in all. In acres its equivalent is 5,760. But the Argentine farmer is not confined to one square league; he has 10 or he has 100 or more. Some have 500 leagues, some 700 and others still more.

These colossal farmers are termed *estancieros* (es-stan-see-air-os). The farms are *estancias*—es-stan-see-ahs. Picture these huge *estancias*. In extent, some will reach from New York to Philadelphia, and they vary in width from 10 to 25 miles. They are inconceivable areas.

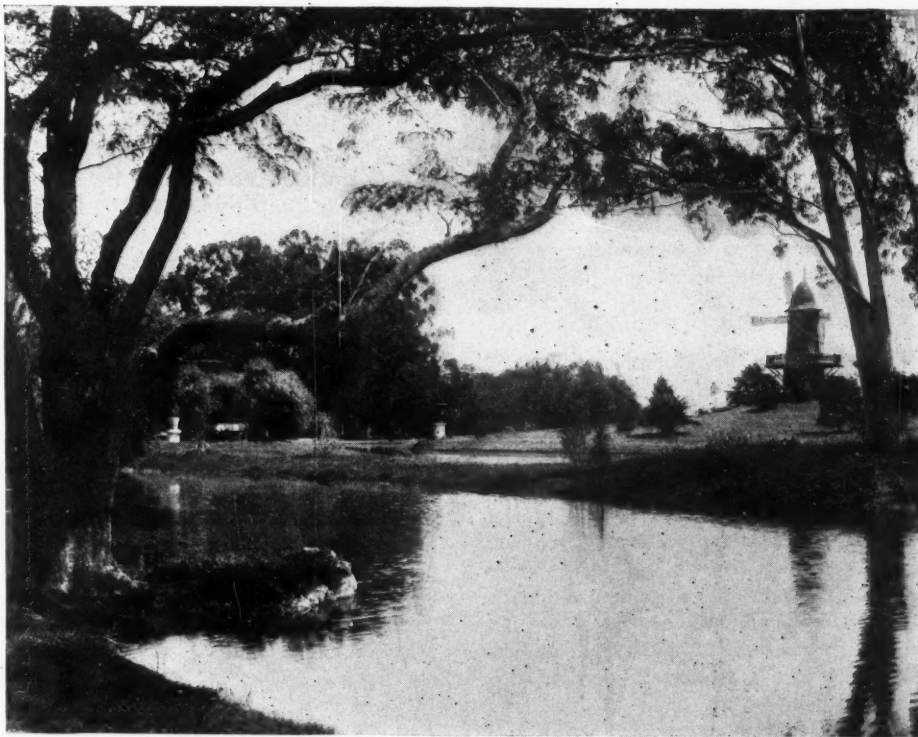
The Estanciero

The rich *estanciero* does not attempt to farm this as our Iowa farmer does. He does not aim at cultivating it all in wheat or corn, but he eventually aspires to have countless herds of cattle, sheep and horses grazing over it in rich alfalfa fields, and also hopes to have many sections cultivated for wheat and corn as market and other conditions meet his wishes.

He subdivides into small divisions of

100 or 200 acres, as conditions warrant, and rents to the colonist farmer, whom he dots over his huge domain as his fancy serves him. There is no geometrical layout of the tract into squares 1 mile to the side with roadways crossing and recrossing, dividing the land into sections as we know

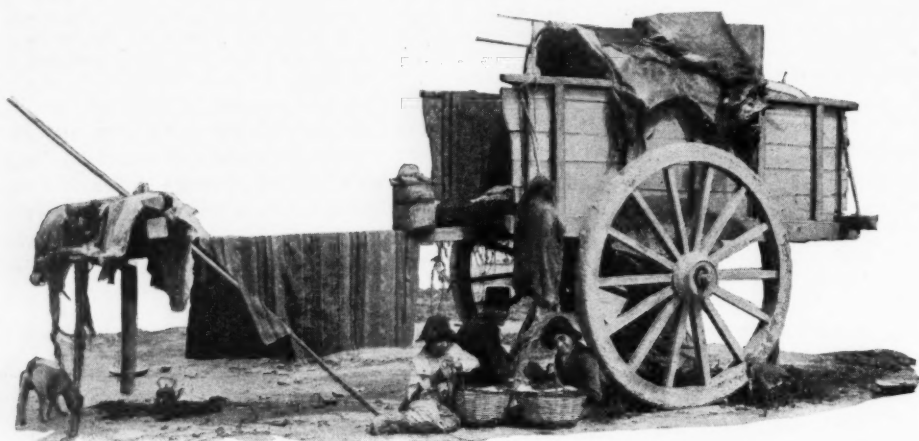
it; rather this rich *estanciero* is a law unto himself as regards the division of his land. If he surveys roads through it, they are the trails found convenient for hauling the wheat and corn from the colonists to the nearest railway depot, or the trails needed in driving the herds of cattle from one



*On a motor trip from Buenos Aires to La Plata, 63 miles, we saw only one of them. There are others, but they are far back from the main road. Here the *estanciero* lives in the summer time. Do not imagine that all *estanciero* homes are so grand; there are many that are only one story in height and made out of mud, but they are very large, with many rooms and every convenience.*



The Argentine cart is indigenous. It is as much a part of the pampas landscape as the herds of cattle or sheep, the mud huts, or the estanciero's homes. The pampas cart is as awkward in modern transportation as a giraffe in an Atlantic City Easter parade. It has wheels as much as 12 feet in diameter and is capable of loads from 6 to 18 tons. These are medium sized carts loaded with grain. There are seven horses to each. The roads here are hard and dry, but when soft as many as thirty-five horses may be seen drawing one of these carts. Naturally roads of great width are needed, and sometimes when on an Argentine road it calls for a good arm to throw a baseball from one side to the other. These roads are generally well fenced. In wet weather these roads are the wettest places on the pampas, the rivers excepted. The roads are generally worn lower than the adjacent fields. Year after year the wind carries the soil off the roads and leaves it on the fields, but the grass holds it on the fields and so the roads wear lower and lower until they are huge shallow ditches that get hopelessly wet after a rain. Frequently a cart such as these remains stalled for several days, the farmer in the meantime pasturing his horses nearby.



The smaller camp cart is often cart, home, Pullman car and dining car. Here is one. It has smaller wheels and is shown camped in the street of a small village. The entire family sleep, eat and travel in it. The horses or oxen pasture along the roadside.

part of the estancia to another, or the trails needed for the general use of the people. The trails are private trails very generally, with fences on either side, and many gates. They are not public roads. They have been built by the estanciero. They have been taken from his own land and have been made by himself. Frequently he has opened them to the public, and they are now virgin trails along which you or I could go at our pleasure. In other places they are yet private, and you may find a padlock on gates and find it necessary to ask permission to use certain trails.

On these square leagues of territory the estanciero has built his palatial home. He has selected the most attractive spot, a low highland overlooking some river and from which he surveys his endless areas, or a shaded side of a hill, a few of which break up the monotonous level of the pampas. Here he erects his house that compares with the finest on Lake Shore drive, Chi-

cago. Often it is a literal palace. It is an oasis in the pampas. For miles you see it standing against the sky, as the top of some lone spire in our own Iowa or Illinois. You may have driven 30 miles, perhaps 60, in your motor car, waiting to see the home of an estanciero, and at last its roof and chimneys pierce the horizon and you feel as the country boy getting his first glimpse of the Woolworth building or Chicago's Masonic Temple. For miles you have passed nothing but mud huts, hundreds and thousands of them. This sea of pampas is in places dotted with them. Stand up in the tonneau and you can count twenty in the circle the eye surveys. Near Buenos Aires and in the old and rich corn land near Rosario you may count fifty of them. They are much closer than the farm houses in Minnesota or Wisconsin.

Here in his two or three-story house, generally more suited for the finest residential street in Buenos Aires than the camp, lives

the estanciero, an agricultural lord, a ruler of land that outrivals many of the knights and petty war lords of Europe 400 years ago. In the summertime he lives here, but in the winter he lives in his city house in Buenos Aires, or maybe at one of the city's finest hotels, or perchance may spend 3 or 4 months in Paris and along the Mediterranean.

Many of the wealthiest estancieros have their city offices in Buenos Aires, where they maintain a corps of five to ten clerks and transact the business much as a lumber firm or a large grain house in Chicago. Here he arranges with the packers for the sale of his cattle or sheep. Here he meets the buyers of Europe and sells them his well-bred horses, which he often counts in thousands. Here he may sell the grain, and here his accounts with all of his colonist farmers are kept. Perhaps the father runs the city office and lives at the Plaza hotel, the best in the city, and the sons spend the summer months on the estancia, giving that immediate attention which is needed.

A Cattle Fancier

The estanciero is a great cattle fancier. He is equally proud of his cattle and his sheep. A year ago a leading estanciero paid over \$35,000 for a prize bull. Well-bred stallions and brood mares bring large sums; in fact, nothing stands in the way of the estanciero when he wishes to improve his stock. Stock improvement has been one of the best influences that has spread through the Argentine camp. It has raised the standard of cattle and has contributed largely to building up the greatest cattle industry. But this price is a low figure. During the last 20 years the finest breeds from Europe have been brought over, bulls selling as high as \$90,000 each, U. S. gold. In the census of 1908

Argentina had 30,000,000 cattle, 67,000,000 sheep and 7,500,000 horses. Since then the number has increased rapidly and the next census, due in a few months, will show how rapidly the development in stock-breeding is taking place.

Leave the estanciero, his square leagues and his cattle in tens of thousands and look on the other side of Argentine's rural picture, the colonist farmer:

The colonist farmer is a name unknown in the U. S. A., but it is the middle name of farming in Argentina. The colonist farmer rarely owns land, although it is hoped a change will soon come and make him a land owner. He rents for a term of 3 years and gets very little out of the deal. The estanciero goes fifty-fifty with him on the grain grown and furnishes him with a mud hut of one or two rooms to live in. He furnishes him with seed, but the colonist has his own horses and a few cows and pigs. The illustrations show the adobe huts in which they live. They are mere shells with mud inside and mud outside. Sometimes they are tinted red or pink from the natural coloring of an earth obtained, but more often are black and whitish black. They rest directly on the ground, and the mud floor is the top surface of mother earth. Rarely do you see a window. Inside they are almost void of all forms of furniture. Rugs are unknown. There is a small table, a few chairs and perhaps a bed, but often the earth floor is the bed, and the sheepskin from the saddle the only mattress afforded. On the walls hang no pictures. The eye searches for the daily paper in vain. Books are wanting. Here is no home inspiration. Although the hut is often dry and very clean, it is often damp and very dirty. With colonist farmers there are good and bad.

Colonists' Dilemma

These colonist farmers generally work on a 3 or 4-year lease. According to agree-

ment with the estanciero, they break up or plow the pampas and for two or three seasons grow wheat, corn, oats and other grains, and then sow alfalfa. When the alfalfa is well established they are through. Their work is done and they seek some other part of the estancia where the ground has to be cropped for a few seasons and then added to the alfalfa zone. Thus they are a sort of nomads with no permanent home, no fixed interest in any one plot they can call their own, and no fixed friendships. They are wanderers without homes. The majority are Italians, many of whom have never known a higher level of home and consider themselves fortunate in their present state.

These colonists are between the devil and the deep sea. Slowly pressing them on one side is the estanciero and on the other

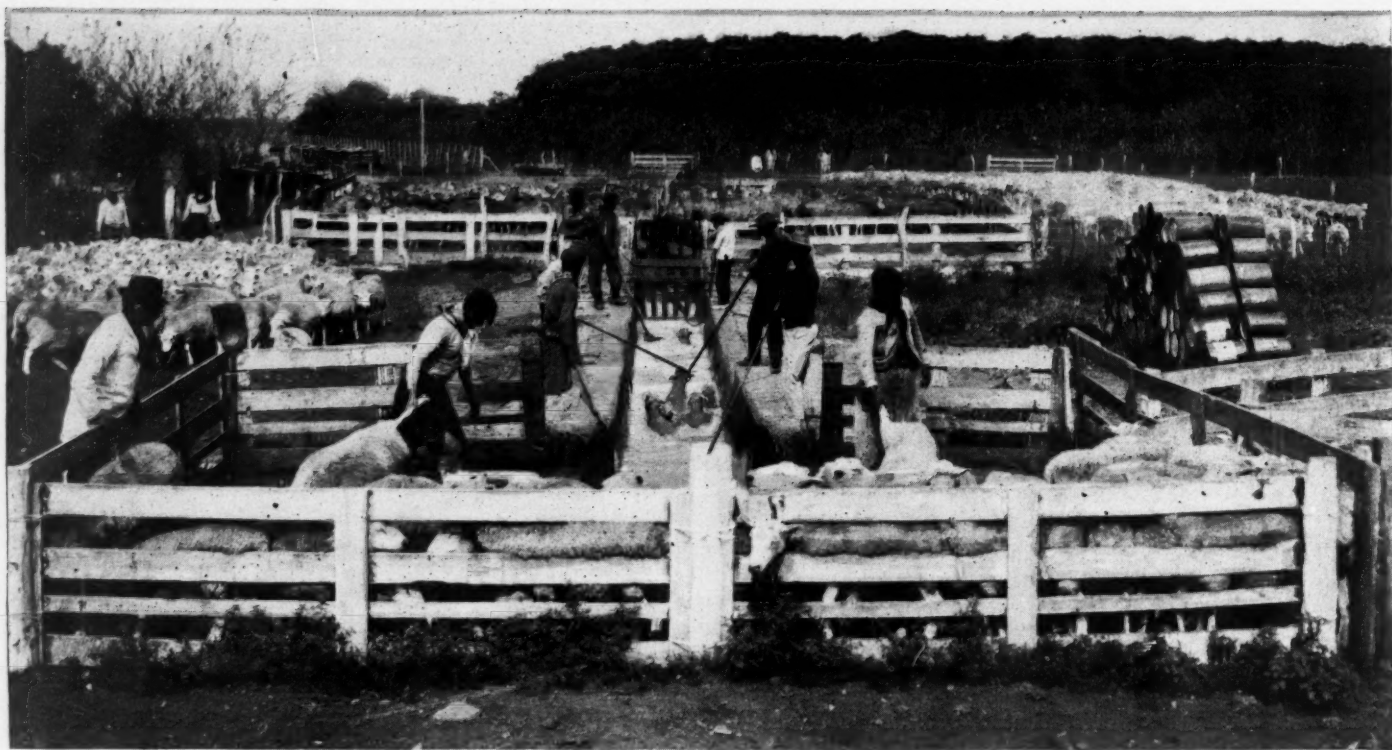
side another citizen, that the Argentine must sooner or later eliminate, namely, a kind of cross roads storekeeper, who, in addition to selling the colonist his groceries, hats, boots and clothes, buys his grains and generally finances him from crop to crop. When the colonist buys he rarely has money, and the cross roads storekeeper is his banker. In turn he gets the hip hold on the colonist. He buys his grain soon after it is sown and at a price that generally robs the colonist of all profit. Thus from crop to crop the colonist is in the clutches of this parasite. What the estanciero does not extract in the lease the storekeeper gets later. Thus the colonist for years has been doomed to existence between upper and lower millstones. He was not born under a lucky star. Fate has chilled him. The face of Argentine is



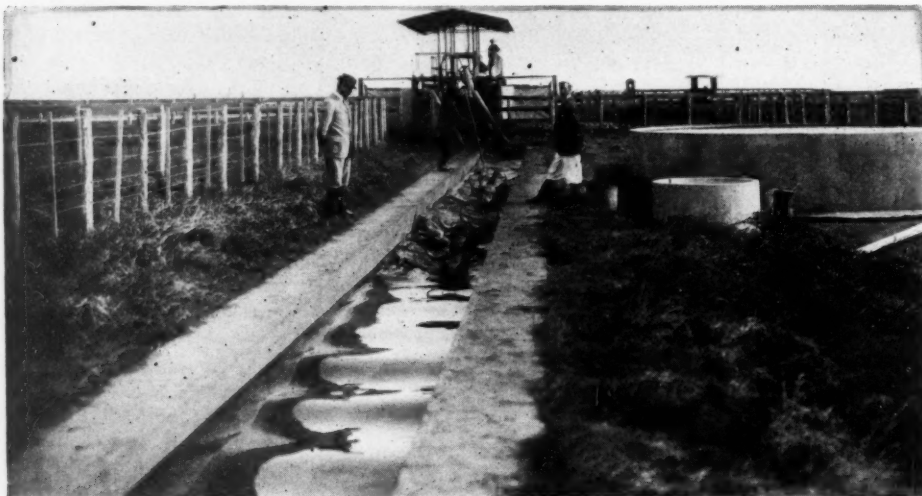
There is not an attribute, with the exception of a few shade trees, that goes with the home in U. S. A. The colonist farmer is largely a meat eater. Vegetables are practically unknown to many, but here they live in the most fertile land in the world, with soil and climate suitable for the best fruits and vegetables, and yet fruits and vegetables are practically unknown. A very large percentage of the Argentine colonists are Italian; in fact, Italy has by far the largest percentage of population in Argentine of any European lands



The mud huts in which the colonist farmers who rent from the estancieros live. These are typical examples. You see hundreds, perhaps thousands, in a day's trip over the pampas. Sometimes they are ¼ mile apart, and other times ½ mile. There is one hut to live in and another to shelter the cow, the dog or the pigs. Around these mud huts you see no smiling gardens of flowers or no gardens of kitchen vegetables. The orchard is wanting



The cattle are troubled with certain flies and all of them must be forced to swim through a bath of prepared dip that will kill any insects. The same is true of the sheep. It is just as essential that the estanciero be provided with adequate facilities to do this work as it is that he have cattle for his square leagues



The estancia is a great institution rather than a large farm. When an estanciero has 100,000 cattle or sheep he is a great wholesaler and must do things on a wholesale basis. Thus in keeping his cattle and sheep he has to have things on a large scale.

scarred. The inspiration of the U. S. A. farm landscape is lacking. The land is refreshing, but civilization depressing. It is not the civilization of Buenos Aires, and perhaps those natives who say that the camp is 100 years behind the city speak conservatively.

Another paragraph on the camp picture: You cannot think camp life without thinking cart life. Argentina is the land of carts. The four-wheel wagon is largely unknown in most sections. There are a few places, such as the Russian sections, in the center parts of the pampas where the four-wheel wagon is used, but in general carts. Here again is the face of the U. S. A. different from the face of Argentina. The Argentine camp, and it is indigenous,

is a colossal creation. In proportions it shares the magnitude of the country. From the train windows you will see three and sometimes four of these huge carts in their snail-pace procession rolling along, elephantine in proportions and in awkwardness of movement. They are higher than railroad cars, larger than the colonist houses and as local to the pampas as the camel caravan to the Sahara, or the elephant of India.

But the face of Argentina is changing. The transition has already set in. The process will be a lengthy one. Buenos Aires large dailies, *La Nacion* and *La Prensa* boast now of how the end of the estancia is in sight, of how there will be a division of these vast areas into the smaller farms

of Dakota, and of how arrangements are being made so that the colonist farmer will be able to buy outright his own land and end forever this program of rent and move, rent and move.

Then the estancia is being reduced in size by the old owners dying and the estates being divided among sons and daughters. Other estancias get into court hands through bankruptcy proceedings and they, too, diminish. So step by step the change is working, and it may be that in 25 years Argentina will have an entirely new appearance.

Today the motor car is aiding in this transition. We told last week of how our first cars were being sold to the estanciero. There are hundreds of thousands of them who are financially able to buy cars. Today there are not any roads. There are virgin trails. But roads will come as they have come with the swiftness of the magician's art in our own Mississippi valley states. What has happened west of Chicago will happen west of Buenos Aires.

The government has required the railroads given a percentage of their earnings for the improvement of wagon roads in the vicinity of depots. The percentage was small and the expenditure of it often injudicious. Roads have profited little by it, excepting in some provinces good work has been done. In proportion as railroads developed, wagon roads fell into the background, so that a giant's task awaits the present generation.

It is believed that developing a modern roads system will be relatively easy because of the estancia system, but this brings us to the subject of next week's article.

Gruelling Tractor Demonstrations in Kansas Make Sales

None of the Machines in Exhibition Failed to Make Good in Difficult Tests

HUTCHINSON, Kan., July 27.—Kansas soil is proving a difficult test for the farm tractors that have been brought here for the second of a series of eight national tractor demonstrations started July 18 in Dallas, Texas. The Kansas demonstration was officially opened on Tuesday and from then until now the grounds have been thronged. The attendance is, perhaps, not quite as good as it was at Dallas, because there is not as great a metropolitan area from which to draw and because railroad facilities are not as great. Still, the crowd is an excellent one and has been drawn from the farthest corners of the state.

A fair number of bona fide sales already have been made, though few dealer and distributor contracts have been signed to date. Manufacturers are now signing prospects obtained at the Dallas demonstration, many of them having left men behind for that purpose, so likely much of the business here will be deferred until after the furore of the demonstration has subsided somewhat. In a measure this is an encouraging sign, for it makes it plain that such contracts are not being signed merely on momentary enthusiasm or because of a type of hysteria peculiar to gatherings of the kind. Generally, careful investigation precedes the making of contracts.

New Life for Trade

That the demonstration will stimulate sales there seems no doubt. Of late, owing to a long-continued drought and to partial failure of wheat and corn crops, implement dealers and motor car men handling tractors have assumed a condition of lethargy which has not augured well for sales. In fact, sales have fallen off quite noticeably since the first of the year and tractor manufacturers look to this demonstration to bolster up the courage of dealers and to inject new life into the trade.

Absence of rain throughout Kansas is having somewhat of a double-barreled effect. In the first place it has retarded the corn crop to such an extent that dealers state that if no rain falls within a short time, fully two-thirds of their accounts will have to go over until next spring. And in the second place, it has left the ground almost stony hard where uncultivated and given tractor manufacturers the hardest kind of plowing to do. A supplementary effect, and an altogether important one, is that not one of the tractors has failed to make good in the demonstration. Thus, farmers and dealers who would be impressed by tractor plowing under ordinary conditions are doubly impressed by the good work being done under the present adverse conditions.

It is true that during the first day of plowing many more or less tortuous fur-

rows were plowed and that in some cases it was necessary to have as many as three men on a gang of three plow bottoms in order to get the plows in and to keep them in. But notwithstanding, this is not held against the tractors but is rather taken as an indication of their ability, for it is realized that horseflesh could not plow under similar conditions—that is, without at least four horses to a bottom instead of the usual two.

This year, tractor manufacturers and those who view the demonstrations have a definite means of knowing exactly how much work a tractor must do to pull its plows. Each morning before the plowing is started, dynamometer tests are made to ascertain the average draft per plow bottom in various parts of the field. These figures, obtained with a hydrostatic dynamometer developed and operated by the Hyatt Roller Bearing Co., are then posted at the test furrow where they are obtained. Knowing the power of the tractor, which is displayed on a sign carried by the machine, and the number of plow bottoms pulled, spectators can then refer to the test figures and make allowance, if necessary for the condition of this part of the field. The average draft per bottom on Tuesday, the first day, was 710 pounds.

The character of the soil is quite different from that in Texas and moldboard plows are used almost exclusively. It is admitted that better results might be obtained, at least insofar as the tractors are concerned, if disk plows were used, but Kansans are wedded to moldboards and they are used in the demonstration for this reason. In Texas it is almost impossible to use a moldboard because it will not scour, due to the sticky soil.

Kansas Needs Tractor

Does Kansas need the tractor? Will the tractor prove a success in Kansas? These two questions are perhaps best answered by referring to the work done a year ago in the demonstration. But first let us examine conditions in Kansas up to about a month or two ago. There had been exceedingly heavy rains; so heavy, in fact, that in the great wheat belt the land was left soggy and entirely full of water. This naturally retarded the wheat. Subsequently there has been a month-long drought which has dried out that water very quickly and left the ground very hard. The net effect has been that whereas Kansas had a banner year last year, getting an average of nearly 30 bushels of wheat to the acre, this year's average is expected to be between 6 and 9 bushels an acre.

Now examine into what the tractors did last year.

The field that was plowed last year in the demonstration already has yielded an average of 24½ bushels of wheat to the acre as against the figure of 6 to 9 bushels for adjoining fields.

What better argument could be wanted for the genuine need of the tractor in Kansas? Why, this great difference, you say? Briefly stated, the reason is this: Deeper plowing.

The Kansas farms which this year are yielding only between 6 and 9 bushels of wheat per acre were plowed only between 5 and 6 inches deep last year. The demonstration field that has given a crop of 24½ bushels to the acre was plowed to a depth of 9 to 10 inches.

Gasoline is used here to a slightly greater extent than was the case in Texas. Strictly speaking, however, it is not gasoline, but is better styled naphtha. Gasoline here is defined as having a gravity higher than 58. Gasoline tractors, however, are burning fuel which measures about 57.3 Baume. This fuel costs 18.3 cents per gallon. Kerosene measures about 44 and is selling this week for 7.3 cents.

TRACTORS AT FREMONT NEXT

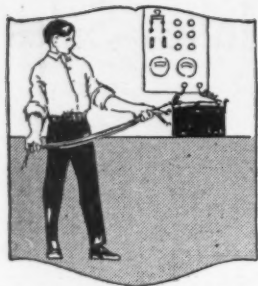
Omaha, Neb., Aug. 2.—Although Fremont, Neb., is not a big city as cities go, it bears the unique distinction of being the first American city to foster the promotion of an extensive farm tractor exhibition, and is prepared to produce a repetition of its former successes at the fourth annual national farm tractor farming demonstration which opens there on Monday, August 7. Numerically and in its representation of tractor manufacturers, the field is superior to any former power show.

Those who have followed the swift rise of the tractor exhibition in the United States know that it found its inception in the first of the Fremont demonstrations, held early in the fall of 1913; on a relatively small tract of Dodge county land. Cradled in the broad domain of the middle corn belt region, the demonstration idea developed from a single show with sixteen entrants to the present national circuit embracing the West from Texas to Canada.

TRACTORS DEMONSTRATE AT SHOW

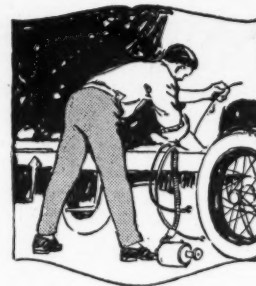
Toledo, Ohio, July 29.—A practical demonstration of farm tractors will be held in Toledo August 8 by Toledo implement dealers. The idea of the demonstration, which is expected to attract 5,000 people, is to introduce the tractor to the farmer who handles 80 acres or more of land.

Ten machines will be demonstrated, but there will be no competition. A 20-acre farm has been selected for the demonstration.



Electrical Equipment of the Motor Car

By David Penn Moreton & Darwin S. Hatch.



Editor's Note—Herewith is presented the sixth installment of a weekly series of articles which began in *Motor Age*, issue of June 29, designed to give the motorist the knowledge necessary to enable him to care for and repair any and all of the electrical features of his car, no matter what make or model it may be. At the conclusion of this series, "Electrical Equipment of the Motor Car," with additions, will be published in book form by the Class Journal Co., Chicago, in a size to fit the pocket conveniently.

WHAT HAS GONE BEFORE

The fundamentals of electrical circuits of the motor car were explained through their analogy to water systems and the relations of current pressure and resistance brought out. This was followed by an explanation of series and multiple circuits and how electricity is made to do work in lighting, starting, signalling, etc. Calculating the capacity of a battery for starting and lighting and the cost of charging storage batteries and determining the torque a starting motor must develop were explained.

Part VI—Primary Batteries

IF two pieces of unlike metals be immersed in a solution, which is capable of acting upon one of them more than upon the other, there will be an electrical pressure set up between them. This electrical pressure will produce a current of electricity between the two pieces of metal when they are connected by a wire which passes from one piece to the other outside the solution. Such a combination of plates and solution constitutes what is called a voltaic cell as it was first discovered by an Italian physicist, Volta, and was named after him. It is, however, sometimes called a galvanic cell, after Galvani, who was Volta's contemporary.

Two pieces of metal, such as copper and zinc, immersed in a solution called the electrolyte of dilute sulphuric acid, as shown in Fig. 47, forms a simple voltaic cell. This cell is capable of producing a continuous flow of electricity through a wire whose ends are connected to the zinc and copper strips. When the electricity flows, the zinc is wasted away, its consumption furnishing the energy required to drive the electricity through the circuit composed of the solution, the two plates and the outside electrical connection between the plates. The cell, for convenience, might be thought of as a chemical furnace in which the fuel is zinc.

The strip of metal from which the electricity flows as it passes through the portion of the circuit outside the cell is called the *positive pole* or *positive terminal* of the cell; while the plate toward which the electricity flows in passing through the portion of the circuit outside of the battery is called the *negative pole* or *negative terminal* of the battery. In the above case, the copper will be the positive terminal and the zinc will be the negative terminal. The positive and negative terminals of a cell are usually designated by the plus (+) and minus (−) signs, respectively. Storage batteries often are marked with these signs.

Primary and Secondary Cells

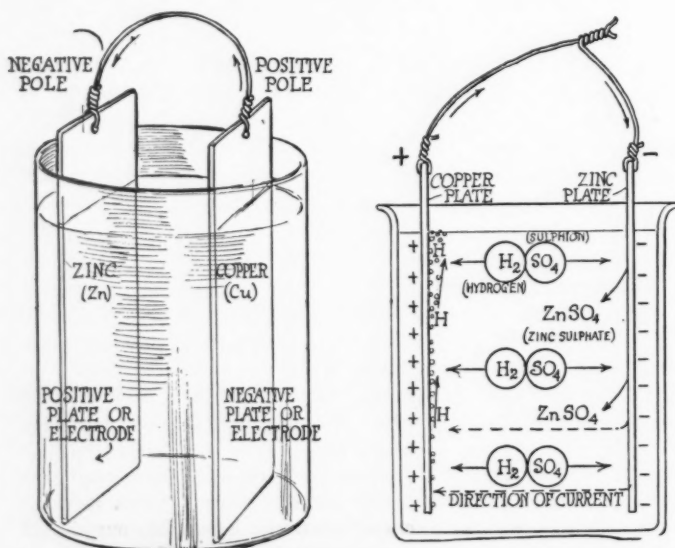
If a cell is capable of producing an electrical current in a circuit directly from the consumption in it of some substance, such as zinc, it is called a *primary* cell. If, however, a current of electricity must first be sent through the cell to bring it into such a condition that it is capable of producing a current it is called a *secondary*, or *storage* cell. The fundamental distinction, then, between a primary and a secondary, or storage, cell is that, with the latter type the chemical changes are reversible, while with the former type this is not practical, even when possible.

Action of a Primary Cell

The action taking place in the primary and secondary cells, when they are delivering a current, is practically the same but the action in the primary battery is perhaps a little easier followed and it will be given in detail. The cell shown in Fig. 48, which is composed of a piece of zinc and a piece of copper immersed in a solution of dilute sulphuric acid, is a good example of a primary cell. Cu is the chemical symbol for copper and Zn for zinc. Water is composed of two parts of hydrogen, whose chemical symbol is H, and one part of oxygen, whose chemical symbol is O, and, accordingly, water is represented chemically by the symbol H_2O .

Sulphuric acid is composed of two parts of hydrogen; one part of sulphur, whose chemical symbol is S; and four parts of oxygen. Accordingly it is represented chemically by the symbol H_2SO_4 .

The sulphuric acid acts chemically upon the zinc, the acid is broken up into two parts, H_2 and SO_4 . At the same time the chemical action is taking place in the cell, there is a certain amount of electrical activity present. In this particular case, the two parts of the acid, H_2 and SO_4 , are charged with positive and negative electricity respectively when they are separated. The SO_4 part possesses a negative charge and hangs on to the zinc plate, giving to the zinc



Figs. 47 and 48—Simple voltaic cell made of copper, zinc and sulphuric acid. Fig. 48, at the right, shows the chemical action in the cell

plate a negative charge and at the same time combining with a part of the zinc, Zn.

You can think of the zinc which combines with the SO_4 part of the sulphuric acid as taking the place of the H_2 part of the acid and making a new compound called zinc sulphate and represented chemically by the symbol ZnSO_4 . This zinc sulphate is dissolved by the water in the cell just as sugar is dissolved when it is placed in water. The result of the action at the negative or zinc plate is a wasting away of the plate itself, the formation of zinc sulphate, and the production of a negative charge on the zinc plate.

The H_2 part of the acid possesses a positive charge and, instead of hanging on to the zinc plate, as in the case of the SO_4 part of the acid, it passes over to the copper plate where it gives up its positive charge and then rises to the surface of the liquid and goes off into the atmosphere. As a result of this action, the positive or copper plate becomes positively charged.

The entire chemical action within the cell is represented by the diagram given in Fig. 48. The acid is broken up into two parts, H_2 and SO_4 . The H_2 part has a positive charge of electricity and travels in the direction of the current, and the SO_4 has a negative charge of electricity and it passes in the opposite direction to the current. The fact that the charges of electricity on the two plates are of opposite sign causes a difference in electrical pressure to exist between the two plates. This difference in electrical pressure will produce a current in a conductor connecting the two plates and the chemical action within the cell will continue to go on. The energy of the chemical action within the cell is transformed into the electrical energy of the electricity flowing in the circuit.

If there is no electrical connection between the copper and zinc plate, outside the cell, the chemical action will go on until the two plates are charged, and it then stops.

The action of all primary cells is similar to the one just described. That is, the electrolyte is always broken up into two oppositely charged parts, and these two parts give up their charges to the two plates. The difference in electrical pressure between the two plates depends upon the kind of plates and the composition of the electrolyte, and is independent of the size of the plates or the volume of the electrolyte.

Polarization

The hydrogen gas is likely to cling to the positive plate after it has given up its charge and form a layer of hydrogen gas over the surface of the plate. This accumulation of hydrogen gas in the positive plate is called *polarization*. The hydrogen gas is a very poor conductor of electricity and, as a result, the resistance offered by the cell itself to the flow of electricity through it, which is called the internal resistance of the cell, is increased and a larger part of the electrical pressure between the plates is used within the cell in order to force the electricity through the higher resistance. As a result, there is a decrease in the pressure available outside the cell to force the electricity through the outside circuit.

There is an electrical pressure set up between the film of hydrogen gas and the copper plate whose direction is opposite the electrical pressure between the zinc plate and the copper plate and as a result the net electrical pressure of the cell is decreased.

Depolarization

In order that a cell may operate satisfactorily, it is desirable that the hydrogen gas be removed in some manner from the positive plate, and this process is called *depolarization*. There are various methods employed to depolarize a cell and these methods give rise to the various forms of primary cells.

One of the most common methods is to introduce into the electrolyte some chemical, called a *depolarizer*, which has an excess of oxygen in it. The excess oxygen in the depolarizer readily combines with the hydrogen on the positive plate and forms water, whose chemical symbol is H_2O .

If the action of the depolarizer is rapid, which results in the hydrogen gas being removed as fast as it tends to accumulate on the positive plate, there will be no decrease in the pressure between the two plates of the cell even though it be operated continuously. A cell of this kind is called a *closed-circuit* cell.

If the action of the depolarizer is less rapid and there is a gradual accumulation of hydrogen on the positive plate regardless of the action of the depolarizer, there will be a decrease in the pressure between the two plates of the cell when there is a current through the cell, and as a result the cell may be used only intermittently in order to allow the oxygen in the depolarizer time to clear the hydrogen from the surface of the positive plate. A cell of this kind is called an *open-circuit* cell. The ordinary dry cell is a good example of the open-circuit type of cell, and it is a well known fact that the voltage of a dry cell will decrease when connected to a circuit continuously.

If a closed-circuit cell be allowed to stand on open circuit, that is without there being any outside electrical connection between the plates, the depolarizer in the majority of cases ruins the cell by causing certain chemical changes in the electrolyte. It is essential that the different types of cells be used in the kind of a circuit for which they are intended, in order that the best results may be obtained from the cells.

Local Action

In addition to the polarization action which takes place at the positive plate, there is an action taking place in the cell, usually at the negative plate, called *local action*. This local action is generally caused by some impurity in the material forming the plate. For example, suppose there is a small piece of carbon imbedded in the surface of the zinc but in contact with the electrolyte of dilute sulphuric acid. It is readily seen that a small voltaic cell is formed when the piece of impure zinc alone is placed in the electrolyte as

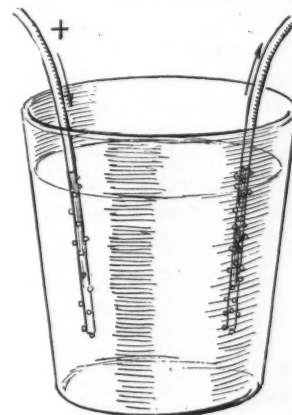
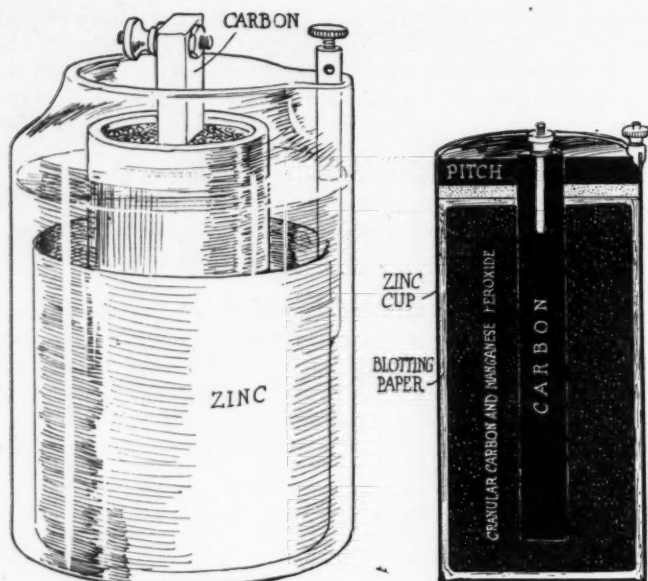


Fig. 49—To tell the positive terminal from the negative terminal of a battery, connect a wire to each pole and dip the ends of the wire in a glass of water. The current decomposes the water into hydrogen and oxygen, the hydrogen coming off the negative pole and the oxygen off the positive terminal. As there is twice as much hydrogen as oxygen in water, the terminal giving off most bubbles is the negative

there are two different materials immersed in a solution which acts on one of them more than it does on the other. The acid will be broken up into two parts, H_2 and SO_4 , with positive and negative charges respectively. The SO_4 will cling to the zinc and give up its negative charge, and a part of the zinc will combine with the SO_4 to form zinc sulphate, ZnSO_4 . The hydrogen goes to the piece of carbon and charges it positively, instead of going over to a second or positive plate. As a result of the presence of the impurity in the zinc a small cell is formed and the zinc is consumed but there is not terminal voltage as the carbon and zinc are in direct contact with each other and a short circuit is formed.

Electrochemical Equivalent

The rate at which the negative plate of a voltaic cell is consumed depends upon how much current is passing through the battery. If the plate is pure, there will be no chemical action when there is no current through the cell and hence no metal will be consumed. The rate at which the negative plate is consumed depends upon how much chemical energy must be converted into electrical energy in a given time just as the rate at which coal is consumed in the fire under a boiler depends upon how much heat energy must be transformed into mechanical energy and delivered by the engine. If the cell supplies 1 ampere for 1 hour, there is a definite quantity of zinc consumed, and if it supplies 2 amperes for 1 hour, there is just twice the quantity of zinc consumed. If a current of electricity be sent through a cell in the opposite direction to that in which it tends to flow due to the pressure of the cell itself, there will be a reversed chemical action taking place in the cell and the same amount of zinc will be recovered from the electrolyte and deposited upon the zinc plate in 1 hour by



Figs. 50 and 51—Leclanche cell, a typical wet cell, at left, and a common type of dry cell at right

a given current as was consumed in supplying the same value of current for 1 hour. The rate at which the zinc may be recovered from the electrolyte and deposited on the zinc plate will be twice as great for a current of 2 amperes as for a current of 1 ampere; three times as great for a current of 3 amperes as for a current of 1 ampere; etc. This last operation of breaking up the electrolyte and depositing the metal contained in the electrolyte is called *electrolysis*. This is the principle used in electroplating.

The quantity of any metal forming the negative plate of a cell which is consumed in 1 hour, when the cell is supplying a current of 1 ampere, or which is deposited in 1 hour when a current of 1 ampere is caused to flow backward through the cell, is called the *electrochemical equivalent* of the substance.

Damage Due to Electrolysis

Under certain conditions, considerable damage may occur to some part of an electrical circuit due to electrolysis. For example, if two pieces of metal which form a part of an electrical circuit are making poor contact with each other and this contact is moist, there will be a chemical action taking place at the contact when there is a current in the circuit which results in the metal from which the electricity flows being wasted away and carried across the contact and deposited on the other piece of metal.

Polarity Indicator

The positive and negative terminals of a direct-current circuit can be determined by dipping the terminals, at some distance apart, into a tumbler of water. The current in passing through the water decomposes it into oxygen and hydrogen, the oxygen going in the opposite direction to the current and the hydrogen in the same direction as the current. The volume of the hydrogen gas resulting from the decomposition of the water will be approximately twice as great as the volume of the oxygen gas, and hence, there will be more bubbles collected on the negative terminal than on the positive terminal, as shown in Fig. 49.

A solution of iodide of potassium, with a little starch added, is sometimes sealed in a short piece of glass tubing and terminals provided at the ends by which contact can be made with the solution. When a current is produced in the solution, iodine is liberated at the positive terminal and turns the starch blue around this terminal.

The Leclanche Cell

The Leclanche cell is a good example of an open type of wet cell, and its operation will be given somewhat in detail as the operation of the dry cell described in the next section is practically the same. The first forms of this cell consisted of a carbon rod imbedded in a mixture of manganese peroxide, and broken carbon, all contained in a porous cup. This cup was placed in an electrolyte of ammonium chloride commonly called sal ammoniac, and the negative terminal

was formed from a piece of sheet zinc but into a cylindrical form and surrounding the porous cup. The construction of the cell is shown in Fig. 50. The manganese peroxide forms the depolarizer and the only object of the porous cup was to hold the mixture of manganese peroxide and broken carbon around the positive plate.

In the more modern forms of this cell, the porous cup has been dispensed with and a mixture of carbon and manganese peroxide are moulded together with a suitable binder.

Dry Cell

The modern dry cell, so extensively used at the present time, may be looked upon as a slight modification of the Leclanche cell. The chief difference between them is that only enough water is added to the material forming the electrolyte to moisten it and an absorbent layer of starch paste, blotting paper, or cloth which separates the positive and negative poles of the cell. The negative pole is a hollow zinc cylinder closed at one end, which also serves as a container for the remainder of the cell. The absorbent layer used to separate the positive and negative poles is saturated with a solution of sal ammoniac and zinc chloride and placed next to the zinc on the inside of the cylinder. The remaining space between the absorbent layer and the carbon rod is filled almost to the top with a moist mixture composed chiefly of manganese peroxide and granulated carbon. The manganese peroxide acts as the depolarizer. The remaining space at the top of the cup is usually filled with a pitch composition which seals the cell. Terminals are provided at the upper end of the piece of carbon and also at the upper edge of the zinc cup. A vertical cross section of a modern dry cell is shown in Fig. 51.

The internal resistance of a good dry cell when new should be less than .1 ohm but may increase to several times this value within 6 months to 1 year even though the cell may not be in use.

The electrical pressure produced within a dry cell, called its electromotive force, should be in the neighborhood of 1.5 to 1.6 volts when the cell is quite new. The pressure between the terminals of the cell, called its *terminal voltage*, is equal to the electromotive force of the cell when there is no current through the cell. The terminal voltage drops when a current is supplied by the cell, due to the internal resistance and polarization of the cell. In the majority of dry cells, the effect of the counter electromotive force due to polarization is greater than the effect of internal resistance and the average terminal voltage of the cell during its useful life is not much greater than 1 volt.

About ninety per cent of the people using dry cells test them by measuring the current they will supply when the terminals of the cell are connected directly to the terminals of a low resistance ammeter. This sort of a test does not take into account such factors as the temperature, the kind of service for which the cell is to be used, etc., and as a result is not altogether reliable. The same cell will produce a different current through ammeters of different resistances due to there being a different resistance in circuit in the two cases. The higher current being produced with the low-resistance ammeter and the smaller current with the high-resistance ammeter. The maximum current output can be obtained when the resistance outside of the cell is equal to the resistance inside of the cell.

The effect of temperature on the current a cell will supply when connected directly to the terminals of an ammeter is quite pronounced. There is a change in the value of the current of about 1 ampere for each 10 degrees centigrade change in temperature for all temperatures ranging in value from 0 to about 90 degrees.

A good dry cell should produce a current, when its terminals are connected directly to an ammeter, of from 16 to 25 amperes with an external resistance not exceeding .01 ohm. A cell producing a current much less than 16 amperes is more than likely composed of cheap materials or it has been made for a long time. If the cell produces a current much in excess of 25 amperes it is likely to polarize rapidly and as a result its terminal voltage will decrease faster than one which produces a lower current.

The ampere-hour capacity of a dry cell ranges in value from 5 to 25 ampere-hours, when discharging continuously through a resistance of 15 ohms until the terminal voltage drops to .5 volt, depending upon the quality of materials used, the age of the cell, the tempera-

ture of the cell, etc. The ampere-hour capacity of a dry cell is greater when it is called upon to produce a small current than when it is called upon to produce a relatively large current. Thus a cell producing a current in a circuit of 16 ohms will supply a larger number of ampere-hours than it would if producing a current in a 4-ohm circuit.

The ampere-hour capacity of a battery on intermittent service, such as in ignition, is entirely different from its ampere-hour capacity when producing a current continuously. The terminal voltage will decrease more rapidly at first when the cell is producing a current continuously than when it is producing a current intermittently, but, after the cell has been in service for some time, the terminal voltage of the cell producing the current intermittently will decrease faster than the terminal voltage of the cell producing the current continuously.

An Electric Battery

If a number of cells be connected in series—the negative plate of one cell joined to the positive plate of the next cell, and so on—an electrical pressure will be produced between the positive plate at one end and the negative plate at the other end equal in value to the sum of the pressures produced by the different cells connected in series. Three dry cells are shown connected in series in Fig. 52.

If a number of cells be connected in parallel—the negative plates of all the different cells connected together to form one terminal and the positive plates of all different cells connected together to form a second terminal—an electrical pressure will be produced between the positive terminal and the negative terminal equal in value to the pressure produced by a single cell, provided the different cells are each producing the same pressure. Three cells are shown connected in parallel in Fig. 53.

Any series, parallel, or a combination of series and parallel connections of cells constitutes a battery.

It is customary in practice to represent a cell by means of two parallel lines, instead of drawing a picture of the cell each time you want to show it in a diagram. In Fig. 54, a battery of three cells is represented. The long line corresponds to the plus (+), or positive, terminal, and the short line corresponds to the minus (—), or negative, terminal.

Proper Combination of Cells for Best Results

Suppose that a piece of apparatus having a resistance of 16 ohms is to be operated from dry cells and that the voltage must not be less than 2 volts at any time. Two cells connected in series will produce the desired results until their terminal voltage drops to 1 volt per cell. If, however, four cells be used and they be connected two in series and the two series groups in parallel, a much longer life will be obtained from the cells than when only two cells are used.

In the first case, the two cells are each carrying the total current, while in the second case, each cell is carrying only one-half of the total current as there are two groups of cells in parallel. In the second case, each group of cells might be thought of as discharging through a resistance of 32 ohms rather than 16 ohms and the life will be more than twice as great as the life of the two cells when used alone or discharging through a resistance of 16 ohms.

When a number of cells are connected in parallel, they should all produce the same electrical pressure and have the same internal resistance. If the electrical pressure in one path of the parallel circuit is greater than the electrical pressure in the other path or paths, then there will be a current through the path of higher pressure into the path or paths of lower pressure. The direction of this current in the path of higher pressure will correspond to the direction of the pressure in that path, while the current in the path or paths of lower

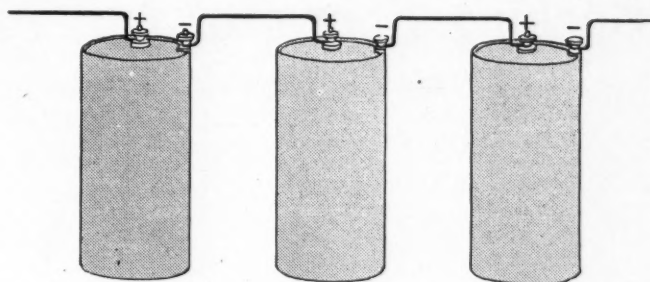


Fig. 52—Three dry cells connected in series, the negative terminal of one cell joined to the positive plate of the next

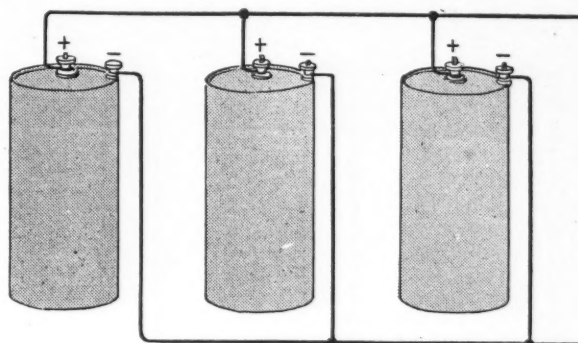


Fig. 53—Three dry cells connected in parallel or multiple, the negative plates of all joined together and the positive plates of all joined

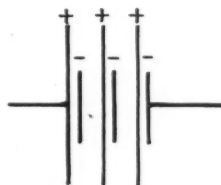


Fig. 54—Usual way of representing a battery in wiring diagrams. The + and — marks usually omitted

pressure will be in the opposite direction to the pressure in the respective paths. This condition of affairs results in the cells in one path discharging into the cells in some other path or paths and there is a chemical action taking place, which is detrimental to the life of the cells, even though there be no current supplied to the device or apparatus the cells are to operate. For this reason it is always advisable to have the total pressure in each path of a parallel circuit, formed by connecting a number of cells, the same.

If the resistance of one path of a parallel circuit, formed by connecting a number of cells in parallel, is greater than the resistance of the other path or paths, then a greater pressure will be required to produce a current of a certain value in this circuit than will be required to produce a current of exactly the same value in the other circuits. The same loss or drop in pressure will be produced by a small current in the path of high resistance and by a larger current in the path of lower resistance. Assuming the total pressures in the different paths are equal, and since the pressure between the terminals of all the paths will be the same, then the drop or loss in pressure in each path will be the same, and hence, it is obvious that the current in each path cannot be of the same value. The path of higher resistance will carry a smaller current than the path or paths of lower resistance. In order that cells may operate satisfactorily in parallel, it is desirable that the total internal resistance and the resistance of the connecting leads be the same in each path.

NEXT WEEK

Part VII of Electrical Equipment of the Motor Car will explain the action of storage batteries, how they are made and what happens on charge and discharge

Bucking Snows of Mt. Hood in Oregon with a Paige



At this point, which is the highest reached on snow-capped peak, the car was covered with snow and ice

By Use of Latticed Boards Car Is Driven 6 Miles Up Big Western Peak Over Snow 100 Feet Deep

By Chester A. Moores

OF all the stunts that have been performed with the modern day motor car perhaps the most unique was staged in Oregon recently when, with the aid of eight husky men and a half dozen latticed boards, a Paige was driven under the power of its own engine 6 miles up the south of Mount Hood, the tallest snow-capped peak in all Oregon, which towers to a height of 11,224 feet above sea level.

Over Snow 100 Feet Deep

For approximately 4 miles of the 6-mile climb the car was above snow that ranged in depth from a few feet to more than 100 feet. Only in a few places did it buck the snow. Before making the strange ascent W. B. Doan, president of the Paige Motor Sales Co. of Oregon, discovered that a motor car can be taken almost anywhere on snow by laying down latticed boards in the pathway of the car. He learned that fact by putting his car over 2 miles of unbroken snow and thereby winning the silver cup posted for the first car that reached Government Camp at the southern base of the mountain.

Every dealer in Portland had his eyes on that coveted trophy and every device from planks to block and tackle were employed in trying to solve the riddle, but it was not

until Mr. Doan's helpers devised the scheme of nailing small boards together in combinations somewhat resembling a ladder, but with extra boards across the back to prevent slipping, that any car was able to top the snow and win the cup.

Flushed with his victory over the snow, Mr. Doan immediately launched forth on the climb of the snow-covered mountain peak. It was a tough job even to reach the timberline for no road ever has been constructed leading to the mountain from Government Camp and it was almost impossible to jump over big boulders and wedge through between.

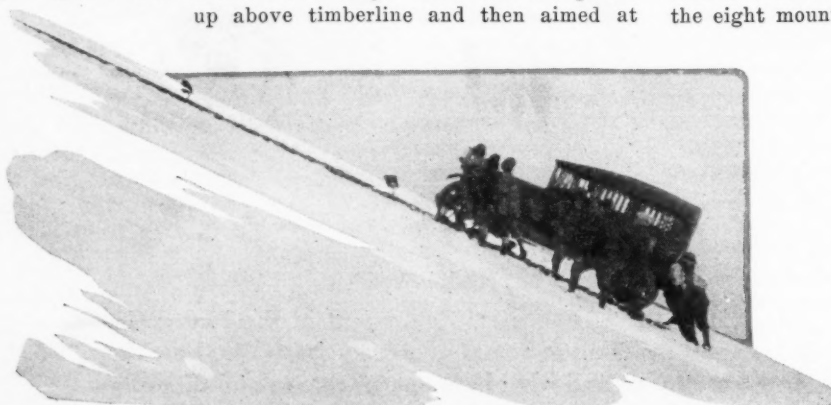
Often it was necessary to cut down big trees and build temporary bridges in order to get across treacherous gaps at the base of the mountain, but somehow or other after 2 or 3 days' work the car pulled up above timberline and then aimed at

Crater Rock, a sharp point that stands at an elevation of 9,500 feet and which is in the neighborhood of $\frac{3}{4}$ mile from the top of the great mountain. The snow-battling crew, which included men who have scaled the mountain on foot many times, felt that they might possibly reach Crater Rock. They knew it would be absolutely impossible to ascend beyond that point.

Gradometer Shows High Reading

After passing what is known as Balance Rock and ascending .7 of a mile farther, the car struck the perpetual snowfields, which are steeper than ever this year on account of the unprecedented fall of snow in the West, and then its real work began. First the gradometer on the car recorded grades of 25 to 30 per cent. Then they jumped to 35 and 40 per cent and all this time the car was climbing over the cleated boards that were strewn in its path by the eight mountaineers.

During almost all of the climb the mountain was visited by a snow storm and blizzard. The men camped on the side of the mountain 5 or 6 miles aloft from any human habitat. On one or two occasions the car was almost encased by ice that had formed during the night and it was necessary to cut some of the ice away with axes before the ascent could



Some of the way the grade was as high as 40 per cent



High on Mount Hood, showing icicles on car

Road Inquiries Answered

Havana, Ill.-Akron, O.

Havana, Ill.—Editor Motor Age—Kindly give me the best route from Havana, Ill., to Akron, O., and the volume of the Automobile Blue Book that covers this routing.—J. A. Dew.

The most direct route over good roads is to go to Easton, Mason City, New Holland, Lincoln, Shirley, Bloomington, Gibson, Hoopeston, Ambia, Oxford, LaFayette, Burlington, Kokomo, Marion, Petroleum, Domestic, Celina, St. Marys, Lima, Kenton, Marion, Galion, Mansfield, Olivesburg, Ashland, Lodi, Medina, Montrose and Akron.

Pittsburgh to the South

Pittsburgh, Pa.—What is the best route for reaching the Jackson highway from Pittsburgh?

In what southern states is a resident of Pennsylvania required to take out a license? —Murray Fahnestock.

One way to reach the Jackson highway from Pittsburgh is to go down to Washington, Wheeling, Zanesville, Lancaster, Washington Court House, Cincinnati and Madison to Louisville and pick up the Jackson highway at Louisville. However, you can go south from Washington Court House to Aberdeen, Ky., ferrying the Ohio at that point to Maysville, and there drive over the northeast section of the Jackson highway through Paris, Lexington and Frankfort to Louisville. This takes you through the blue grass region of Kentucky and the road from

During the trip there was a severe sleet storm. Think of it! in July

be continued. Often the workers were compelled to place corks in their shoes until the slippery surface of frozen ice had melted sufficiently to give them traction.

When the car finally did stop at a point slightly below Crater Rock the gradometer recorded a grade of exactly 50 per cent, or half of vertical. Ahead of that point the grade got steeper and steeper, the old-time mountain climbers in the party estimating it to be 65 or 70 per cent.

The car really pulled the grade under its own power. Once in a while several of the men placed their shoulders at the tail end, but this was only when the wheels slipped on the ice coated boards.

Discussion Scouts Idea

The trip up the side of the mountain has inspired all sorts of discussion not only among dealers of Portland but throughout the state. Frank Branch Riley, president of the Mazamas, a mountain-climbing organization, has publicly condemned the feat. At first he tried to ridicule the idea and pronounced it as utterly impossible to get up the side of Mount Hood. Then, when he realized that it actually had ascended miles above the point he thought it was possible to go with any vehicle, he entered a public protest, claiming that it injured the reputation of the mountain from the standpoint of the mountaineer. He said the climbing of Mount Hood was a game for life ropes and ice axes and not for motor cars and that the impression that Mount Hood could

be climbed by motor put it in the same class with Pike's Peak.

Mr. Riley's letter brought forth charges that the Mazamas were only jealous because a car came along and climbed a peak which they had thought tough enough to climb afoot. The controversy as to whether or not the motor car ascent of the mountain will give Mount Hood favorable or unfavorable publicity is still being waged in Oregon. Meanwhile the movie weeklies are flashing the trip all over the country.



This shows type of boards used to give traction

Maysville on is good. There is a 30-mile stretch of rough road just north of Maysville, in Ohio, but you can make 15 to 18 miles an hour over it.

You will find that for the southern states you will be exempt from 7 to 60 days from taking out a motor car license if you comply with all the regulations of your home state.

Comments on Illinois Marked Roads

Frankfort, Ill.—Editor Motor Age—Referring to the map of marked roads on page 31 of the July 6 issue: I would call the attention of Motor Age, and its readers, to two routes which the business men of Frankfort have marked, under my guidance. One is from Chicago, starting at 119th and Western avenue, Morgan Park, and follows south on Western avenue to Broadway, in Blue Island, then turns west and south to Frankfort and connects with the Lincoln highway. This route is marked with black letters on a white background with the letters C-F, meaning Chicago to Frankfort.

This route passes the Midlothian golf grounds as well as the road that leads into the Cook county poor farm at Oak Forest. Blue Island garage men state this route has been of great help to them, inasmuch as there are five turns in the road within two miles of Blue Island, which would confuse a motorist going to these points or to points farther west.

The second route is marked with black letters on a white background with the letters V-J, meaning Valparaiso to Joliet. This has always been a traveled road, and is the only hard road all the way, and the shortest and best road, notwithstanding what some associations or people wish to say. This road and the Lincoln highway are one and the same for a portion of the way. The V-J line, however, is a hard road all the way and has less railroad crossings and other dangerous crossings to contend with.

I notice Motor Age routes motorists through Frankfort, but wish to make it clear that the Lincoln highway touches Frankfort on the north edge, whereas the V-J line passes through Frankfort, but touches it at Brown's Corners at a point below Chicago Heights. The map of the roads in Illinois shows the Lincoln highway as passing through Matteson, which is an error. It passes a little to the north. The Egyptian trail does pass through Matteson, but not the Lincoln highway.—C. H. Balchowsky.

Ohio-Nebraska

Tippecanoe City, O.—Editor Motor Age—Kindly give best route from Tippecanoe City, Ohio, to McCook, Nebr., by the way of Elizabeth, Ill., Tracy, Minn., Omaha, Nebr., McCook, Nebr., return by Kansas City, St. Louis and Indianapolis.—M. W. Honeyman.

From Tippecanoe City, Ohio, to McCook, Nebr., the best routing for you to follow is to go down to Vandalia, Englewood, Richmond, Cambridge City, Greenfield, Indianapolis, Danville, Rocksville, Chrisman, Newman, Triscola, Atwood, Decatur, Springfield, Valley City, New Salem, Hannibal, Monroe, Shelby, Macon, Brookfield, Chillicothe, Cameron, St. Joseph, Falls City, Stella, Auburn, Nebraska City, Syracuse, Lincoln, Fairmont, Hastings, Minden, Holdrege, Oxford, Cambridge, and McCook.

Volume 4 and 5 of the Automobile Blue Book will give you the complete routing for your trip.

Vicksburg, Miss.-Portland, Ore.

Vicksburg, Miss.—Editor Motor Age—I wish to take a trip from Vicksburg to the Pacific coast and would like to know the best route. Kindly advise the best route from Vicksburg to Denver, Colo., and from there to Portland, Ore. Is this route better than the southern route by way of El Paso, Texas, and Los Angeles—K. D. Brabston.

In going from Vicksburg to Denver and then to Portland, we advise going west

through Thomastown, Quebec, Rayville, Monroe, Ruston, Arcadia, Allandale, Shreveport, Marshall, Longview, Tuler, Terrell, Dallas, Fort Worth, Wichita Falls, Childress, Amarillo, Clayton, Raton, Trinidad, Walsenburg, Pueblo and Colorado Springs to Denver.

From Denver go through Sulphur Springs, Glenwood Springs, Grand Junction, Price, Salt Lake City, Ogden, Snowville, Twin Falls, Boise, Baker City, Pendleton and The Dalles into Portland.

The southern route by way of El Paso and Los Angeles is a very good road. This is so much farther that we do not advise you going to Portland by this way, but rather going straight to Denver and Boise, Ida.

Volume 5 of the Automobile Blue Book will give you complete running directions for this trip from Dallas, Texas, to Pendleton, Ore.

Sioux City, Ia.-Redfield, S. D.

Sioux City, Ia.—Editor Motor Age—Kindly give me the best route from Sioux City, Ia., to Redfield, S. D.—T. G. Hall.

The best route for you to follow is through Westfield, Akron, Hawarden, Fairview, Beloit, Sioux Falls, Hartford, Lyons, Chester, Wentworth, Madison, Ramona, Lake Preston, then west through Manchester, Iroquois, Huron, then north to Redfield.

Volume 5 of the Automobile Blue Book will give you complete running directions to Huron.

Chicago to Twin Lakes

Chicago—Editor Motor Age—I want to make a trip out to Twin Lakes, Wis. I would like you to pick the best roads to get out there and tell me if they are good or bad and how long would it take to get out there?—A. H. Lagal.

In going up to Twin Lakes there are several good ways but probably the most satisfactory would be to go out Grand avenue to Franklin Park and continue out to Addison and then go through Bloomingdale and Ontarioville to Elgin, then go north to Dundee, Algonquin, Crystal Lake, McHenry, Richmond and Genoa Junction. Twin Lakes is just east of Genoa Junction.

Volume 4 of the Automobile Blue Book will give you the routing up to Genoa Junction by several different roads.

Kansas City, Mo.-Quebec, Can.

Miami, Okla.—Editor Motor Age—Kindly give us the best route, for one of our customers, from Kansas City to Detroit, then to Quebec, thence by boat to Buffalo, then to New York City, down through New Jersey to Washington, D. C., and down into Florida. Then from Florida to Miami, Okla. We have ordered an Automobile Blue Book but thought Motor Age might give us some additional information regarding roads, accommodations, etc., which would supplement that given in the Blue Book.—Coleman-Harvey Buggy Co.

For your customer who is planning a trip from Kansas City to Detroit and then Quebec, we advise that he follow the Blue-Book routing as follows: Volume 5, route 645 to Columbia, 647 to St. Louis; volume 4, route 191A to Litchfield, 193A to Shelbyville, 169A to Terre Haute, 491 to Indianapolis, 410 to Fort Wayne, 478 to Detroit, 728A to London, 728B to Hamilton, then from Hamilton go up to Toronto. Here we would advise that you take the boat to Quebec as the roads are very bad from Toronto to Montreal, unless you would wish to go through New York state from Niagara Falls through Rochester, Oswego, Watertown, Antwerp, Canton, Potsdam, Malone and then to Montreal.

You will find that the Automobile Blue Book will give you as complete information as it is possible for this trip.

Going from Buffalo to New York City the most picturesque routing for you to follow is to go to Batavia, Avon, Canandaigua, Wat-

kins, Ithaca, Oneonta, Stanford, Grand Gorge, Skandaken, Phoenicia, Kingston, Poughkeepsie, Peekskill, to New York City. This routing is completely covered by volume 1 of the Automobile Blue Book.

In going from New York to Florida, there are several ways to go but probably the best routing to follow in volume 6 would be route 51R to Baltimore, 95 to Washington, 1 to Richmond, 123 to Raleigh, 227 to Pinehurst, 331 to Cheraw, 333 to Camden, 335 to Columbia, 351 to Augusta, 421 to Savannah, 551 to Brunswick, and 553 to Jacksonville.

In returning to Miami, Okla., the best way is to follow route 616 to Waycross, 616A to Macon, 525 to Atlanta, 495 to Chattanooga, 649 to Huntsville, 650 to Nashville, 831 to Jackson, 833 to Memphis, 791 to Forest City, 793 to Little Rock. From Little Rock go to Conway, Morrilltown, Russellville, Clarks-ville, Ozark, Van Buren, Chester, Blackburn, Fayetteville, Springdale, Rogers, Bentonville, Sulphur Springs, Pineville, Goodman, Neosho then over to Miami.

Culver, Ind.-Eureka, Cal.

Lake Maximecuckee, Ind.—Editor Motor Age—Kindly give me the best routing from Culver Military Academy, Culver, Ind., to Eureka, Cal.—David Seabury.

The best routing for you to follow is to Bass Lake, North Judson, Tefft, Malden, Valparaiso, Dyer, Joliet, Morris, Ottawa, La Salle, Peru, Princeton, Sheffield, Anawan, Atkinson, Moline, Davenport, Iowa City, Marengo, Grinnell, Newton, Colfax, Des Moines, Adair, Atlantic, Council Bluffs, Omaha, Fremont, Schuyler, Columbus, Central City, Grand Island, Kearney, Lexington, Gothenburg, North Platte, Ogallala, Big Springs.

From here you can take the short routing by way of Sidney to Kimball, Cheyenne, Laramie, Rawlins, Rock Springs, Granger, Evanston, to Ogden. Or, if you wish a more picturesque routing go down to Julesburg from Big Springs, then to Sterling, Fort Morgan, Greeley, Denver, Colorado Springs, Buena Vista, Leadville, Glenwood Springs, Rifle, Grand Junction, Price, Provo and Salt Lake City to Ogden. Then from Ogden the best routing to follow is through Brigham, Snowville, Montello, Elko, Battle Mountain, Winnemucca, Lovelock, Wadsworth, Reno, Carson City, Camino, Sacramento, Marysville, Gridley, Chico, Red Bluff, Peanut, to Eureka.

Volume 5 of the Automobile Blue Book will give you the routing for this trip as far as Sacramento. From here you will need volume 8 over to Eureka.

New Martinsville, W. Va.-Fostoria, O.

New Martinsville, W. Va.—Editor Motor Age—Kindly give me the best routing from New Martinsville, W. Va., to Fostoria, O. Have been informed that detours over the National road are very bad and I would like a route that will take me through New Philadelphia or somewhere near there.—L. W. Oneacre.

In going from New Martinsville to Fostoria, O., the best way is to go north to Wheeling then to Cadiz, Urichville, Tuscarawas, Newcomerstown, Coshocton, Millwood, Mt. Vernon, Mt. Gilead, Edison, Marion, Little Sandusky, Lovell, Crawford and Carey into Fostoria.

Volume 4 of the Automobile Blue Book will give you complete routing for this trip.

Peoria, Ill.-Racine, Wis.

Green Valley, Ill.—Editor Motor Age—Kindly give me the best route from Peoria, Ill., to Racine, Wis., without going through Chicago.—Leslie R. Woodrow.

In going to Racine from Peoria, without going through Chicago, suggest you go north to Lawn Ridge, Tiskilwa, Princetown, Lamole, Mendota, Rochelle, Rockford, Roscoe, Beloit, Delevan, Lake Geneva, Burlington, Sylvania, Racine. Volume 4 of the Automobile Blue Book will give you routing.



The Motor Car Repair Shop



Information Useful in Reconstructing a Car for Speed

What to Expect of Aluminum Pistons and Dangers in Drilling Connecting Rods

THERE are very few garages which do not at some time or other have a customer bring in a car to be rebuilt, especially along racing lines. Such rebuilding often requires data and formulas which are often unavailable, and in the following will be found a list of information and general specifications which should be of use in such work.

H. P. Increased by Reboring

First let us consider the proposition of reboring cylinders. Motor Age receives a great number of letters from garagemen asking how they can determine the piston displacement and N. A. C. C. horsepower rating, after the cylinders have been rebored. Probably the most simple formula for ascertaining the piston displacement is as follows:

$$D^2.7854 SN = PD$$

In this formula D represents the diameter of the cylinder, S the stroke, both measurements of course being in inches, N the number of cylinders, and PD the piston displacement in cubic inches.

As an example we have a four-cylinder motor with a 3-inch bore and a 4-inch stroke. Applying the formula we have:

$$3 \times 3 \times .7854 \times 4 \times 4 = 113.09 \text{ cubic inch displacement.}$$

We will now suppose that reboring increases the diameter of each cylinder $\frac{1}{8}$ -inch, we have:

$$3\frac{1}{8} \times 3\frac{1}{8} \times .7854 \times 4 \times 4 = 117.76 \text{ cubic inch displacement.}$$

The horsepower rating adopted by the National Automobile Chamber of Commerce, and known as the N. A. C. C. rating has been accepted as a standard.

$$\frac{D^2 N}{2.5} = HP$$

In this formula, D is the cylinder diameter, N the number of cylinders, and HP the horsepower. Taking an example in which reboring has altered the specifications as above, that is a motor of 3-inch bore and 4-inch stroke has been increased to a $3\frac{1}{8}$ -inch bore, we have a rating before the reboring is done:

$$\frac{3^2 \times 4}{2.5} = 14.4 \text{ horsepower.}$$

After the reboring is done the formula is:

$$\frac{3\frac{1}{8}^2 \times 4}{2.5} = 15.01 \text{ horsepower}$$

If, after the reconstructed speed car is

completed you desire to take it out on the road or track and with the aid of an ordinary watch, or better still a stop watch, determine the approximate speed it is capable of making, the following figures will be of assistance:

Time for One Mile	Miles Per Hr
.36	100.00
.37	97.30
.38	94.74
.39	92.31
.40	90.00
.41	87.80
.42	85.71
.43	83.72
.44	81.82
.45	80.00
.46	78.26
.47	76.60
.48	75.00
.49	73.47
.50	72.00
.51	70.59
.52	69.23
.53	67.92
.54	66.67
.55	65.45
.56	64.29
.57	63.16
.58	62.07
.59	61.02
.60	60.00

To obtain the velocity of the car in feet per second, multiply the speed in miles per hour by 1.466.

Alloy Pistons

The present trend of car manufacturers in adopting the aluminum-alloy piston has created a great demand for these for use in old cars the owners of which desire to increase the speed. It might be said that the general impression of what these pistons will do seems to be somewhat exaggerated.

Owners have written us saying that their garageman inserted a set of aluminum pistons in their car and the speed was not increased over 2 or 3 miles an hour. They seemed greatly disappointed. True, the lighter metal lightens the reciprocating parts of the motor and in this way permits the speed to be increased to some extent, but it should not be expected that the car speed will be increased 10 or 15 miles an hour, which some owners seem to expect.

Yesterday a car owner phoned Motor Age with reference to trouble he had been

having with newly installed aluminum pistons. He said his car started out with a world of power with the motor cold, but after 10 or 15 miles of driving, the motor began to lag and finally stopped altogether. The trouble was that the garageman, or whoever it was, that ordered the pistons for this car had specified a diameter exactly the same as the cast-iron pistons which were to be replaced.

Aluminum has a greater coefficient of expansion than cast iron, and an allowance must be made for this, or the trouble described above will be experienced. In ordering aluminum alloy pistons, specify to the manufacturer that they are to be of a size practical for use in a motor having cast-iron pistons of such and such a size. Better still send him one of the cast iron pistons. Let the manufacturer figure the clearance that is necessary.

Many a perfectly good motor has been ruined by experiments along the line of setting the valves ahead, altering the cams of the camshaft and drilling out the pistons and connecting rods.

Setting Valve Heads

Setting the valves ahead is all right if you are going to run the motor constantly at high speed. At low speed, however, the explosion is too early and a tremendous and unnecessary strain is thrown on the pistons, connecting rods and all motor bearings. Tapering the cams to produce a quicker lift is a delicate job which should not be attempted by anyone but an expert machinist.

Pistons and connecting rods in cars of fairly recent date, are designed by the factory to be as light as possible and still have the necessary strength retained. When they are perforated with holes with a view of increasing the speed of the car, each hole takes away from that strength which should be there. It is far more pleasant to drive your car at 50 miles an hour and have a durable, sweet-running motor than it is to drive one 53 miles an hour and have a sieve-like crankshaft or connecting rod buckle in the middle and punch a hole through a \$75 crankcase and perhaps tear up a cylinder block.

It is not always true that increases in motor speed beyond that for which the engine is designed can be made without incurring trouble. Manufacturers design their cars with a view of giving the owners sufficient speed with the strength retained.



The Readers' Clearing House



Are Transcontinental Record Drives Dangerous to Traffic?

PITTSBURGH, PA., Editor Motor Age—How can speed traps ever be abolished so long as one or two car manufacturers encourage attempts on the coast-to-coast record and other abuses of the use of our highways? Why should the rights of the vast majority of law-abiding car owners be sacrificed to the advertising whims of a few selfish manufacturers? Where does Motor Age stand on this question?

Is Motor Age playing fair with its readers when it publishes accounts of these stunts in its editorial columns? Perhaps few of your subscribers have taken the trouble to write on this subject, but every car owner knows, that while these big speedsters are apt to escape scot-free, they arouse the animosity of the people along the road. Speed traps are established and, the average motorist, who may be only slightly and unintentionally exceeding the speed limits, is fined and subjected to great inconvenience.

We all know that a fool driver, willing to take all sorts of chances on his own and on other people's lives, is far more important than a good car in establishing these records, so that the advertising value is questionable.—Murray Fahnestock.

EDITOR'S NOTE.—Most motorists, whether they be on transcontinental trips or not, break the state highway laws practically every time they go out in a motor car. The speed limits, as set by the state laws, are so low in most instances that they are violated regularly by almost every motorist on the road. City ordinances set speed limits at certain figures, these usually too low to be observed in practice, so much so in fact, that in most cities traffic officers do not consider it a violation if the legal limit is exceeded somewhat. It is Motor Age's belief that city ordinances are not violated to any great extent in the record-breaking trips you have in mind. When speeds much greater than the legal limit are contemplated within the city, special arrangements with the city officials usually are made and the car is accompanied through the city by motorcycle policemen who serve the double purpose of protecting the public and also the driver. Frequently these cars are driven more conservatively than are those driven by local people who are on the road for perhaps an hour at a time. The transcontinental driver always has safety in view, because it proves too costly to his record if any accident should follow as a result of his driving.

Motor Age would be glad to receive from readers any well vouched for examples of gross violation of road and city ordinances by transcontinental cars.

COMPRESSION AT HIGH ALTITUDE Amount Necessary to Mill from Head of Cylinder

La Jara, Colo., Editor Motor Age—What is the pressure in the Overland model 83 at maximum compression?

2—What is the compression at 7,500 feet above sea level, and how much should be milled off from the cylinder head to bring the pressure to the correct amount at this altitude?—Orion F. Fletcher.

1—About 65 pounds per square inch.

2—The compression pressure would be less the higher you went up. The method of determining the exact amount is given on page 30 of the April 6, 1916 issue of Motor Age. In order to figure how much the detachable head would have to be cut down, the size of the cylinders and compression ratio would have to be known. Roughly, the head would be milled down about $\frac{1}{8}$ inch.

DRY SALT FOR CARBON REMOVAL? Motor Age Does Not Advise Its Use—May Do Harm

Kansas City, Mo., Editor Motor Age—Several times lately I have seen salt used to remove carbon from motors. The salt is used dry and sucked into the motor through the air intake of the carburetor. Undoubtedly it does remove some carbon, as the motor throws out clouds of smoke from the exhaust when running at an ordinary rate of speed.

After cleaned with salt, one Chandler six car, torn down immediately after being treated in this way, showed very few small deposits of carbon and no apparent injury has been done. This motor had been run about 3,000 miles since cleaning.

Will Motor Age kindly advise if it knows of any detrimental action of the salt on the motor. Does the heat of the motor convert



Fig. 1—Dog which has ridden 75,000 miles on running board

the salt into a gas and this in turn cut out the carbon? Are the granules of salt likely to cut the cylinder walls?—H. W. Jordan.

1—Probably some carbon can be removed in this way, but it is not advisable to do it. You will do more harm than good to the motor in the long run.

RIDES BAREBACK ON MOTOR CAR Dog Does Stunts and Obeys Signals Like Circus Performer

St. Louis, Mo., Editor Motor Age—In the last number of Motor Age under "The Four Winds" you show the picture of a dog held on the running board of a ma-

chine by a framework. The enclosed picture, Fig. 1, shows my coach and fox terrier "Rhoda Royal" just as he appears in my daily rounds, where he has ridden for over five years, in which time I have covered upwards to 75,000 miles city and cross country travel, making one trip in 1911 to Maryland and return. He always waits to get on when car has started and frequently, when I tell him he can, he jumps off for a run and hops on again without waiting for me to slow up. When I expect to make a left turn I give 2 short blasts with the horn and he braces himself against side of car and never falls off unless I forget to signal in making the turn. Turning to right naturally throws him against the car. He frequently gets up on the top of the fender to ride and when some barking dog runs around the machine he will climb all around and over the car, crossing over the hood and around behind the gas tank and has never fallen off in so doing; in fact he seems at home anywhere on the car, as a bareback rider on a horse.—Walter B. Yost.

STEAM CARS IN SPEEDWAY RACING Racing Promoters Give the Public What They Demand

Chicago—Editor Motor Age—Can a two-cylinder horizontal opposed engine be reconstructed into a two-cylinder vertical engine?

2—Would a new crankshaft have to be fitted?

3—Kindly state what changes would have to be made.

4—Kindly explain the thermo-syphon cooling system.

5—Does the Fiat, which was run in 1913 by Durant at a speed of 142.9 miles per hour hold the world's speed record, or was there somebody else who drove a car faster than that?

6—If steam cars are more powerful than gas cars, why are they not used more extensively for heavy work, as large trucks and tractors?

7—Why are steam cars not allowed to race with gas cars or by themselves. I hear they are not allowed on speedways, why is this?

8—Were there any special features to the Richard racing car that made it heavier than the rest?

9—Why did the extra weight stop it from qualifying for the race? Did it not have the speed, or did speedway officials not allow it on the track?—L. J. Werner.

1—It could be done, but the expense you would have to go to would probably buy a new motor of more efficiency.

2—Yes.

3—New crankshaft, camshaft, crankcase, oiling system, etc.

4—You probably know how a hot-water radiating system operates. A thermo-syphon system is exactly the same. Hot water is lighter than cold water. In a thermo-syphon system two tubes extend from the radiator to the water jacket of the motor, one from the top and one from the bottom. Motor heat raises the water in the jackets to the upper tube and expansion forces it through the tube into the top of the radiator. Cold air rushing through the radiator reduces the temper-

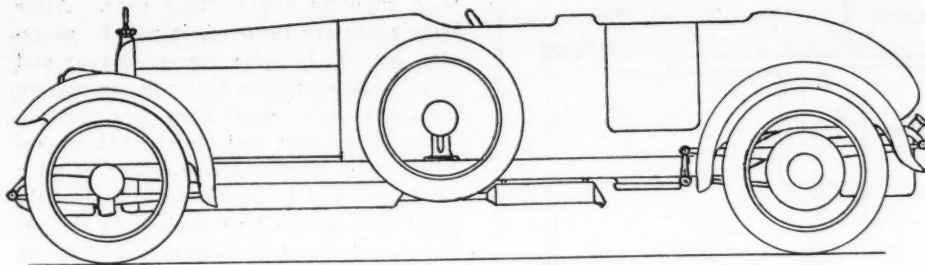


Fig. 2—Idea for speedy touring car submitted by amateur designer

ature of the water and the colder liquid settles to the bottom from where it passes through the lower radiator tube into the motor water jacket, where it again becomes heated. In other words there is a complete cycle of the water, just as in the revolution of the crankshaft. The circulation is automatic, due to the expanding proclivities of water.

5—The exhibition you mention was the fastest mile ever turned but it is not considered official because the tests were not conducted according to the English rules; in other words, the speed is not an average of speeds made with and against the wind. Burman holds the mile speed record. He did the distance with the Blitzen Benz on the Ormond beach course at the rate of 141.9 miles per hour, under official observance of the A. A. A.

6—Under ordinary road conditions the terrific vibration to which a motor car is subjected is too much for the delicate pipes and apparatus necessary in the construction of a steam truck. Furthermore the inconvenience of firing the boilers and the danger of freezing in cold weather is a drawback. It is a question whether steamers are more economical than gasoline cars. Both consume a very nearly equal amount of fuel to develop the same power.

7—Rules applicable to all speedways consider the gas car only and specified motor measurements must be applied to all cars entered. It is very probable that the American Automobile Association would sanction a race between steam cars providing the speedway management was willing to stage such a race. The question of gate receipts has a great deal to do with racing and it is a question whether the public would take to an exhibition of steamers with the same enthusiasm as they greet the roaring exhausts of the gas car.

8—The wheelbase was unusually long, the motor, running gear and body built without any apparent view of reducing weight.

9—Because the trade racing rules specify that a car entered in a speedway race shall not weigh over 2,500 pounds.

WEB SYSTEM OF MOTOR BALANCING Reader Wants to Know What Makes Use This Type

Athens, Tex.—Editor Motor Age—What motor manufacturers use the web system of crankshaft balancing?

2—Is it considered as scientific and efficient as the Hudson system?

3—What low or medium-priced cars use it?
4—What advantage has spiral bevel over bevel gear final drive?

5—What medium-priced cars with small six motors have the highest r. p. m.?

6—What five car manufacturers lead in number of sales, exclusive of the Ford, Chevrolet and Overland?

7—What manufacturers make the Hupmobile motor?—John W. Searls.

1—We cannot give you all of them, but among those who have fitted some kind of balanced shaft utilizing the webs is the Continental company.

2—The principles involved are different. It is not within the scope of the Clearing House to go into a discussion of the merits and demerits of crankshaft balancing. The only thing we can say is that regardless of the method used, that shaft which is in best running balance produces the best running engine.

3—We do not have this information.

4—It is quieter, since the teeth have a sort of rolling motion with respect to one another. Then, since there is longer contact between the teeth, it makes a stronger drive, so far as the gears are concerned.

5—The Chalmers little six is in that class.

6—Buick, Maxwell, Studebaker, Dodge, and probably Reo.

7—The Hupmobile motor is not a stock motor, but is made exclusively for the Hupmobile under contract. That is, it is designed entirely by the Hupp company and made by certain parts concerns for them.

TUNING MERCER FOR HIGH SPEED Alluminum Alloy Pistons Lighten Re- ciprocating Parts of Motor

Houston, Tex.—Editor Motor Age—Kindly give general directions for tuning Mercer model 35 K, so it will be capable of more speed. This car is fitted with a Rayfield carburetor and Stuart vacuum tank, which is not the regular equipment.

2—Would alloy pistons increase the speed to any great extent?

3—Which of the Stewart vacuum systems and the pressure feed are the best for high speed?

4—Would non-leaking type piston rings give motor more power?—L. Lester.

1—We could give you no general directions without knowing something about the present condition of the car, that is the gear ratio, tires, etc.

2—Aluminum-alloy pistons lighten the reciprocating parts and consequently increase the motor speed.

3—Both systems have given excellent results under high speed tests. The pressure feed is most commonly used in racing cars.

4—Yes, if the present rings are leaky.

OLD REO CONVERTED INTO TRACTOR Illustration Shows Unique Method of Al- tering Touring Car for Farm Work

Duncan, Okla.—Editor Motor Age—In the Readers' Clearing House department of the April 13 issue of Motor Age, R. J. Arnold of Central Point, Oreg., asks for information regarding converting his Reo the Fifth into a tractor, and for his information as well as for others interested in tractors, I am sending an illustration from an old issue of the Reo Echo, Fig. 3, which shows the Reo tractor attachment placed on a Reo 4-30. I believe this arrangement will work all right on his car. —Eldon C. Frie.

AMATEUR DESIGNER SHOWS TALENT Thorough Engineering Knowledge Nec- essary for First-Class Draughtsman

El Portal, Cal.—Editor Motor Age—I am sending you a drawing made by myself, and I would like to have suggestions and ideas for it, and I would also like to know if designing of this kind is all right to study as a profession. The car is original and it is not copied from any particular car or drawing. I have had no mechanical training except that I learned a little about the use of drawing instruments last winter in an architect's office.—Laurence Danley.

You undoubtedly have talent in design. If you only had the opportunity to scan the "men wanted" section of a Detroit paper any day in the week, you would realize that there is an unprecedented demand for mechanical draughtsmen of the better sort. Many of the big motor car engineers of today started on the draughting table. It takes training, however. There would be no market for drawings such as you forwarded to us, although we grant it shows ability. Body designers

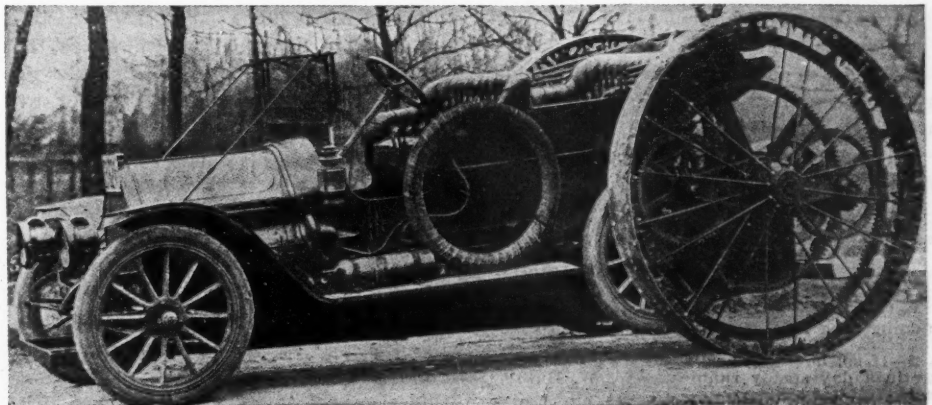


Fig. 3—Old Reo converted into tractor

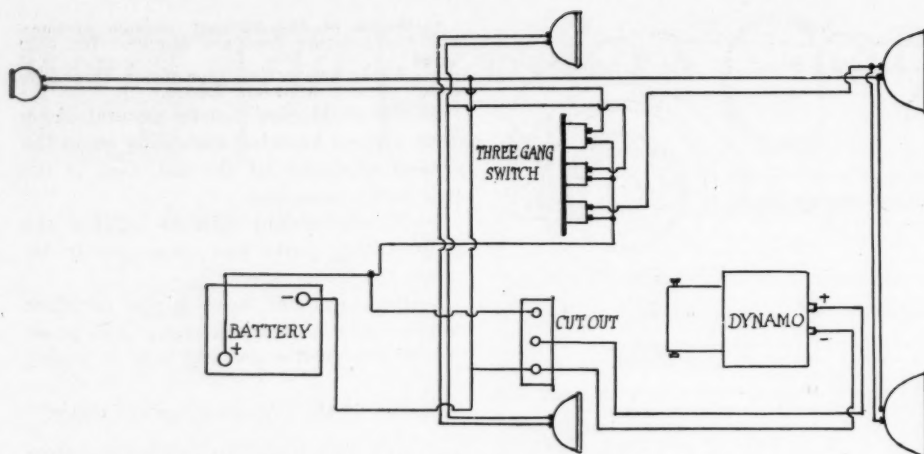


Fig. 4—Wiring diagram of Deaco system on Oakland model 42

have to fit a body to a chassis, inch for inch. They have to be able to lay out the curves in fractions of degrees and inches so that patterns may be made for the sheet metal panels. It requires a thorough knowledge of mathematics and engineering. Why not take a correspondence course in mechanical drawing, and possibly follow that by a course in engineering? Correspondence school graduates are securing very good positions these days. We have printed a copy of your sketch in Fig. 2.

DELCO WIRING ON OAKLAND M-42

Method of Cleaning Generator Brushes—Salmoniac Useless

Frankfort, Kan.—Editor Motor Age—Publish a wiring diagram showing the Deaco generator to cut-out meter on the dash, to the battery, then to the headlight switch. My car is a 1913 Oakland, model 42. The generator is used for charging only, as a Remy low-tension magneto is used for ignition. The generator is marked + — — cut-out + — same 6 volts, 12 amperes.

- 2—If one jar is broken, is it possible to repair it, or isn't it worth it?
- 3—Will two parts of gasoline, one part of kerosene make good fuel?
- 4—Will a small amount of salmoniac help to increase the power, and is it injurious to the motor?
- 5—How can one clean the brushes on this generator? It has been used for ignition.
- 6—Is it injurious to use the generator for lights, horns, etc., without the battery, by connecting all the wires together?—James Morris.

The wiring of the Deaco system is illustrated in Fig. 4.

2—It is not worth repairing. Better put in a new one.

3—Not very good. The carburetor is not designed for such a heavy mixture, and has all it can do to handle the present low grades of gasoline without making the mixture worse by adding kerosene.

4—There is no good reason why it should assist the power, and it certainly would not be good for the engine.

With a fine file file them flat and remove any dirt in the same manner.

6—Very injurious. Don't do it if you want to have a generator that works.

Fuel Saved with Cutout Open

DeLamere, N. D.—Editor Motor Age—Does running with the cut-out open save much gasoline?

2—If so, how much will it save on a Dodge car in a day steady running?—W. W. Hall.

1—Running with the cutout open decreases back pressure to some extent with

the result that there may be a slight saving in fuel.

2—It is impossible to determine such a saving without conducting accurate tests with the same car with the cutout open and closed.

READER IS BUILDING AIR WAGON Will Probably Have to Experiment with Propellers to Get Right Size

Arlington, Tex.—Editor Motor Age—I am building an air wagon and would appreciate your co-operation in answering the following questions: The machine complete with passenger will not weigh over 300 pounds. Would a propeller $4\frac{1}{2}$ feet long be large enough?

2—What pitch should it be?

3—The number of revolutions of motor is about 1,500. Should it be geared direct or two to one—that is, motor turns over twice as fast as propeller? The propeller will be about 5 inches wide.—R. A. Ford.

1—It would do to experiment with, although it will be a matter of luck if your first propeller is perfectly suitable.

2—Four of $4\frac{1}{2}$ -inch as a tryout.

3—The motor should turn twice as fast as the propeller.

INSTALLING NEW SHIFTING GEAR Necessary to Tear Down Maxwell Motor to Make Repair

Burlington Junction, Mo.—Editor Motor Age—How does one put in the shifting gear in a Maxwell Mascotte 1912 touring car? Does the engine have to be taken down? The intermediate gear has to be replaced, that is, the intermediate wheel on the shifting gear.—O. L. Sample.

It will be necessary for you to disassemble your motor from the frame in order to install the shifting gear, but, however, it will be necessary for you to first remove the gear case cover, then disassemble the drive shaft yoke from the rear universal. This yoke is fastened on to the long shaft that leads from this joint to the rear end of your motor. Then disassemble the universal case from the universal body on the rear end of your motor and after these parts have been disassembled your drive shaft will drop out. Then remove the bearing caps that are located in the clutch and gear compartments. Then remove the gear shifter bearing that is located on the top of the crankcase that holds the gear shifter quadrant and shaft in place.

We also wish to state that the gearshaft yoke is fastened to this shaft, and this

yoke supports the shifting gear. After these parts are removed, it will be necessary for you to raise the speed gear and clutch high enough so that you can remove the transmission shaft from this part.

The speed gear and clutch that we referred to is located in the center of your crankcase, and is fastened to the clutch. Great care should be exercised in the removing of the transmission shaft so as not to chip the gear-case bearing gear because once this bearing is chipped it is necessary for you to have same repoured into the crankcase. We trust that with the above information you will have no trouble in removing your gear from your motor.

GIVES METHOD OF LINING WHEELS Measures Between Chalk Marks Made on Center of Tires

Oakford, Ill.—Editor Motor Age—Kindly advise me regarding the automatic cutout on Overland model 83, used in Auto-lite electric system starting and lighting. The points in the cut-out will stick together, due to the magnetism when generator is stopped, and at times the ammeter will show 12-15 amp. discharge and other times when points are connected does not show any discharge. The points will always stick when put together, but if left connected in this way and engine is started it will show charge all right and when engine is stopped the hand on ammeter will swing to about 5 or 3 ampere discharge and points will drop away or separate. This I understand is as it should be, but should these points remain together when connected by lifting lower point with generator at rest? These points would not connect up at first when generator was speeded up, but after clearing brushes and end of core or armature they worked all right.

This will probably be a help to some readers on lining up front wheels. I always adjust hub bearings first, then spin the wheel and hold a pencil or piece of chalk on tread of tire so making a line around same which will be true, it is then an easy matter to measure across from mark to mark and adjust thrust rod. I find this easier and much quicker than measuring between rims which are sometimes hard to get at.—A Reader.

The points should not remain together. Possibly it will get rid of the trouble if the points are dressed off carefully with emery cloth.

Altering Ford for Speed

Ardmore, Okla.—Editor Motor Age—I am going to make a racing car out of my 1913 model Ford, and intend to drill sixteen $\frac{1}{4}$ holes in each piston and four $\frac{1}{4}$ -inch holes in each connecting rod, also put 2-7-11 gear ratio in rear and want Motor Age's advice about taking all of the magnets out, also the field coil or I have an Atwater Kent. Does Motor Age not think by alternating this motor this way that it would make it lighter and faster, and that the flywheel would balance with the pistons, etc.—Raymond Garrett.

Be careful about drilling holes in the pistons. These pistons are about as light as they can be now to insure sufficient strength. The gear ratio you suggest will possibly be satisfactory for track work, but is surely too high for road driving. There is no reason why any damage would be done by removing the field coils and the saving in weight and drag would possibly increase the car speed to a slight extent.

Jeffery Information Incorrect

Due to incorrect information furnished Motor Age by the Thomas B. Jeffery Co., answers to the questions submitted by R. L. Case, Milwaukee, which appeared in the June 22 issue, were erroneous. Mr.

Case inquired about the 1916 Jeffery six and the information furnished Motor Age by the manufacturers covered the 1915 model. In the first question he asks the power developed at 600, 1,200, and 1,800 revolutions per minute, which is 17.5, 36 and 51 respectively.

In the second question he wishes to know at what engine speed the maximum power is developed. This motor develops 54 horsepower at 2,100 revolutions per minute.

In the third question he asks for the gear ratio. The regular ratio is 42/13 to 1, special ratio 4½ to 1.

In the fourth question he asks for the bore and stroke, which is 3½ by 4¼ inches.

The fifth question—he wishes to know the gasoline mileage. This is from 12 to 18 miles per gallon.

BRAKING WITH CLUTCH ENGAGED Answer to Reader's Inquiry Opens Argument—What Is Your Opinion?

Stevens Point, Wis.—Editor Motor Age—Your answer to L. K. Schmidt under caption "Applying Brakes With Clutch In," appearing in your issue of July 7, occurs to me to be somewhat misleading, or in short only half an answer.

If you refer to the braking of a car for the purpose of bringing the same to a complete stop, your answer is substantially correct, but if braking is only for the purpose of reducing the movement of car to safe speed on steep inclines, then will you not find in actual experience that by slowing down your motor to that point where it would otherwise idle nicely, and leave in the clutch, the tendency of the car is to run at a greater rate of speed than the engine would drive it at such idling speed, and therefore, with the clutch in, the engine acts as a brake and an aid to the braking you secure by applying your service or emergency brake; and will not even a greater assistance in braking be secured by throwing off the switch, leaving in the clutch, with your speed lever in high gear, thus permitting car to run against this compression as well as the brake? Or, in short, whenever the motor is running at a speed which, if the clutch is in, it would drive the car at a slower speed than the car is then moving, it becomes an aid in braking if the clutch is not disengaged.—W. B. Angelo.

We agree with you that the motor, with the clutch engaged, is of assistance in braking the car when descending a hill, etc. Nevertheless we maintain that it places a strain on the motor. Furthermore, properly constructed brakes should slip the wheels of a car. If the brakes will do this, what need is there of more friction?

HOW TO REMOVE EVERETT CLUTCH Rough Sketch and Explanation for Releasing Clutch Springs

Mechanicsburg, Ill.—Editor Motor Age—I would like to have a diagram showing how to release clutch spring, so as to remove clutch for replacing on a 1912 Everett 36 which was made by the Metzger Motor Car Co. It looks like it would be very hard to get out and in, and any information will be appreciated.—H. N. Lord.

Fig. 5 shows a diagram of a method by which the clutch spring can be relieved so that the clutch locking washer can be removed. You will note that there are two bolts through the universal joint housing flanges; between these there is a plate which is drawn towards the clutch housing by tightening up the nuts on each of the bolts. The small blocks placed between this plate and the clutch spring washer will tend to compress the spring, allowing the washer to be removed. Upon

Inquiries Received and Communications Answered

Murray Fahnestock.....Pittsburgh, Pa.
Orion F. Fletcher.....La Jara, Colo.
H. W. Jordan.....Kansas City, Mo.
Walter B. Yost.....St. Louis, Mo.
L. J. Werner.....Chicago
John W. Searis.....Athens, Tex.
L. Lester.....Houston, Tex.
Eldon C. Fry.....Duncan, Okla.
Laurence Danley.....El Portal, Cal.
R. A. Ford.....Arlington, Tex.
James Morrissey.....Frankfort, Kan.
W. W. Hall.....DeLamere, N. D.
A Reader.....Oakford, Ill.
Raymond Garrett.....Ardmore, Okla.
H. N. Lord.....Mechanicsburg, Ill.
W. L. Redmon.....Tipton, Mo.
Dr. I. I. Hensel.....Arcadia, Wis.
C. W. Walden.....Freeport, Ill.
Werther Jelden.....Hamilton, Ill.
R. L. K.....Thorm, Ia.
John O. Aldridge.....Alexandria, Ind.
L. G. Jones.....Carnegie, Okla.
W. B. Angelo.....Stevens Point, Wis.

No communication not signed by the inquirer's full name and address will be answered in this department.

loosening the nuts, the tension of this spring will be released and the clutch can be removed.

New Rear Axle on Old Car

Hamilton, Ill.—Editor Motor Age—The rear axle on my Flanders 20 has given me a great deal of trouble. Would it be possible to install a new axle of some other make, and if so where could such an axle be procured?—Werth Jelden.

It would be quite possible to install a different axle. You could secure a suitable one from any one of the firms advertising such parts in the Clearing House pages of the advertising section of this issue. Write them first to find out what they would suggest as best adaptable to the car.

Best Oil to Use in Any Motor

Tipton, Mo.—Editor Motor Age—I have a 1915 Apple 8 touring car. It has an eight-cylinder Perkins motor. Please tell me the best cylinder oil to use in it. I have been advised to use a mixture of half heavy steam cylinder oil and half French gas oil, but would rather have Motor Age's advice.

2—Where is this car made?—W. L. Redmon.

1—Motor Age has never recommended any particular make of lubricating oil for the reason that there are so many kinds on the market of nearly identical value. Any lubricant of reasonable price is a good buy. A cheap oil is dangerous and should be avoided. For an eight-cylinder motor

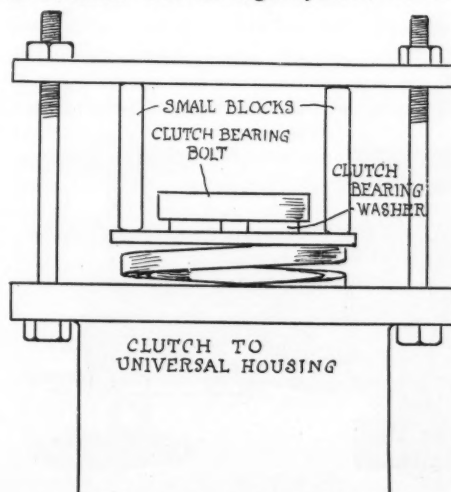


Fig. 5—Rough sketch for use in removing Everett clutch

probably a medium weight would give the most satisfactory results. We suggest that you try out several different brands and select the ones which you consider gives the best operating motor. Get the factory's advice.

2—W. A. Apple Motor Car Co., 343 Cincinnati St., Dayton, O.

Fiat Motored Car Speed

Freeport, Ill.—Editor Motor Age—In building a racing car and fitting same with a Fiat engine, four-cylinder, 5½ by 6½ eight-valve engine fitted with 2½ by 1 rear axle, 35 by 4½ wheels, about how much speed could a person obtain with exhaust out the side of hood and no fenders or running board on?—C. W. Walden.

If the motor you describe would operate at a speed approximating 2,000 revolutions per minute, which it should do if in good condition, the speed of the car would be between 75 and 80 miles per hour, with the gear ratio 2½ to 1.

Queries About Chevrolet

Thor, Ia.—Editor Motor Age—Are the Chevrolet racing cars, driven in the Gardena, Cal., race by George Hill, specials or stripped stock cars?

2—What is the magneto timing on a Detroit four-cylinder car using a Bosch magneto with the spark set?

3—Where can one secure No. 8 gauge resistance wire for a resistance coil?—R. L. K.

1—We have no records that will indicate the type of cars used.

2—The engine fires 1-3-4-2, if that is what you mean.

3—Any electrical supply store ought to carry it.

Why He Kills Engine

Arcadia, Wis.—Editor Motor Age—I have a 1915 eight-cylinder Detroit, and when starting out on low, or on an up-grade, on a hard pull, as soon as I let in the clutch it kills the engine. I would like to know the cause of this, as it has power enough to pull after it is once started.—Dr. I. I. Hensel.

1—Either the carbureter adjustment is off, or you do not give the motor enough gas on starting on a heavy pull. Let the clutch in gently while you accelerate the motor. Very likely the trouble comes from suddenly throwing in the clutch before the motor is sufficiently speeded up.

No Dashlight on Ford

Alexandria, Ind.—Editor Motor Age—Is it possible to connect a dash light with the magneto of a Ford car? If so, kindly publish diagram of same.—John Q. Aldridge.

This can be done with present Ford electric system but it is not advisable.

Cannot Use Dry Cells

Carnegie, Okla.—Editor Motor Age—I have had to remove the storage battery from my Chevrolet 4-90 model for repair. Kindly explain how the dry cell batteries may be connected for ignition purposes for a short time without injuring the generator. It has the Connecticut automatic ignition.—L. G. Jones.

This cannot be done. In other words, the storage battery cannot be replaced by dry cells. Remember that the ignition current comes from the battery just as the supply for the lights and starter is drawn from the battery.

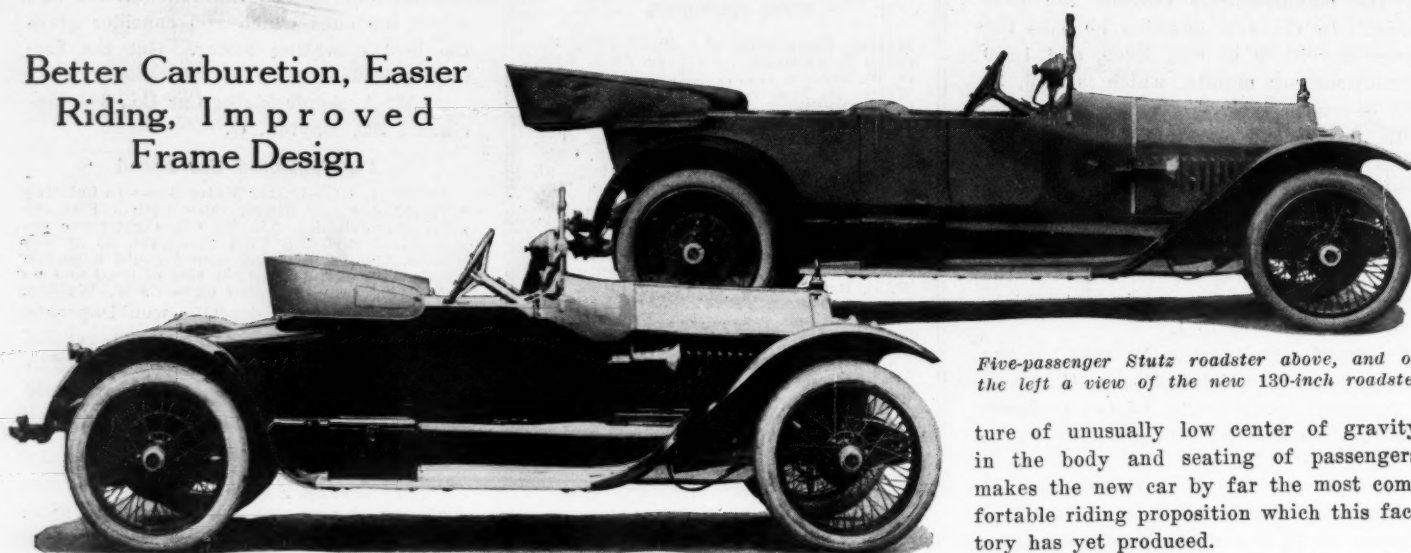
Gear Ratio of 1914 Marion

Golthwaite, Tex.—Editor Motor Age—Please tell me the gear ratio of the Marion Bob Cat four-cylinder, model 1914. Also how I can increase the speed of this car.—D. D. Trent.

The stock gear ratio is 3.7 to 1. See page 31 of this issue. We might be able to give you more information if you furnished us the tire size and general condition of the car.

1917 Stutz Includes New 130-Inch Wheelbase Roadster

Better Carburetion, Easier
Riding, Improved
Frame Design



Five-passenger Stutz roadster above, and on the left a view of the new 130-inch roadster

IMPROVED carburetion to take care of the present low grade of fuel, longer rear springs and a new frame construction to improve riding qualities, increased roominess in the bodies and an entirely new roadster are the changes in the 1917 line of Stutz cars which stand out most prominently over the former models.

A standard wheelbase of 130 inches has been adopted for all models, which will consist of Bull Dog specials, coming in both four and six-passenger bodies, and the new roadster. The price of \$2,550 for the Bull Dog specials is the same as that on the previous models, while the new roadster price, which is \$2,275, is an increase which is justified by a longer wheelbase and a great number of refinements. The only change in the powerplant is in the location of the carbureter and manifold and the new facilities for heating the gases.

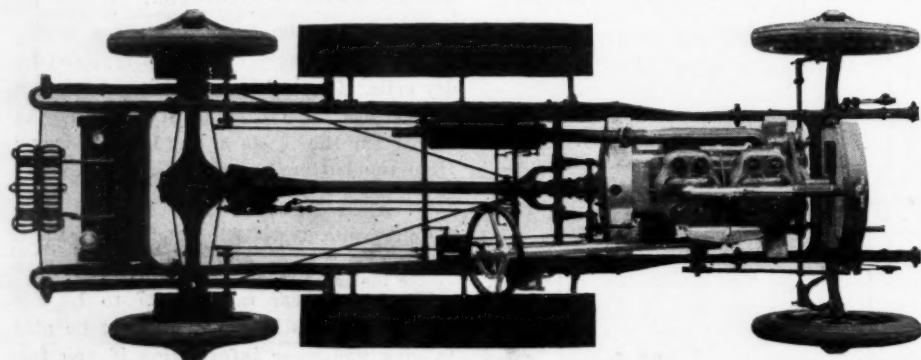
Water-Jacketed Manifold

The new manifold has a water jacket of unusual capacity which is connected over the top of the motor by a short pipe directly to the water exit pipe which leads to the radiator. Not satisfied with this method of heating alone, the Stutz designers have installed a flexible hot-air tube from a stove on the exhaust manifold which leads between the two cylinder

blocks to the air intake in the carbureter. This construction not only permits the entrance of heated air into the mixing chambers of the Stromberg but also eliminates the chance of condensation of the gases, as they pass through a hot manifold before entering the motor.

The new carbureter location is several inches higher than that of the previous models, making the instrument very accessible. The frame has been increased in size. The side bar is now 5 inches deep with a $3\frac{1}{2}$ -inch width in the center gusset plates, which are integral with the side bar. The rear of the frame is now extended to form a spring hanger by the use of U-shaped forgings instead of the goosenecks previously used. The gasoline filler cap has been moved from the center to the right side of the tank, where it is more accessible.

An alteration in the chassis design which not only makes a much easier riding car but permits a straight-line drive through the double universal joints, is the increase in length of the rear springs from 50 to 56 inches and so changing the design that when the car is loaded these springs lie perfectly flat. This, together with the Hartford racing type shock absorbers which are used as regular equipment on all models and the characteristic Stutz fea-



The new rear spring supporters and longer springs are to be seen in this tip view of the Stutz chassis

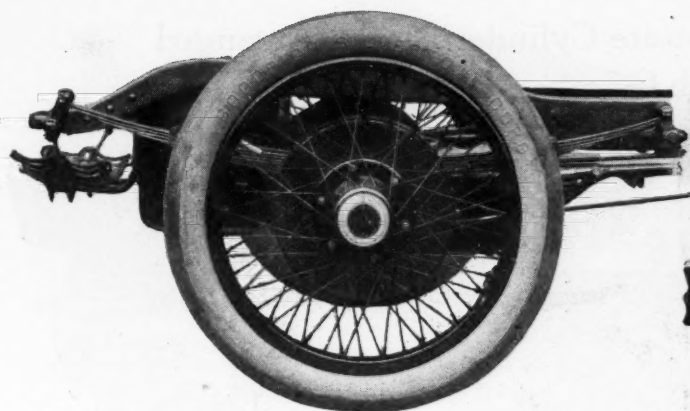
ture of unusually low center of gravity in the body and seating of passengers makes the new car by far the most comfortable riding proposition which this factory has yet produced.

In speaking of the new Stutz bodies, of course the brand new roadster is the most interesting because of its newness. The body is placed on the standard 130-inch wheelbase whereas all previous Stutz roadsters were on a 120-inch wheelbase. In the place of the combination oil and gas tank and traveling trunk evident on the old roadster, the new car has a modified turtle back rear with a depression, circular in form, for carrying an extra wire wheel and tire. The wire wheel carrier provides a very substantial support; in fact the wheel is fitted on to lugs much as it is when it is in place on the axle. With the addition of a special padlocking device for safety, the spare wheel is placed so that there is no vibration.

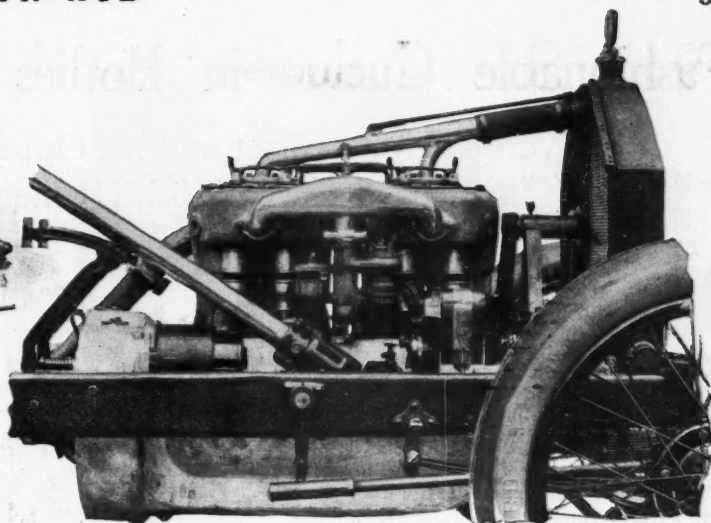
Suit-Case Compartment

There is a carrying space in the rear of this body directly in front of the spare wheel space and behind the seat which is large enough to hold two or three suit cases. Entrance to the compartment is gained through a large door on the top which is locked by a key on both sides. The body length of the touring cars has been increased 4 inches and the width 1 inch over the corresponding dimensions in the last series of the same model. The increase in length is all taken up in the rear compartment so that ample leg room is provided both for the passengers in the auxiliary seats and in the rear seats. The bodies of the four-passenger and the six-passenger are identical except that in the latter folding auxiliary seats are substituted for the cowl cabinet and thermos bottles which in the four-passenger are carried as regular equipment.

Stutz cars for 1917 in their general makeup comprise a four-cylinder, pair-cast, T-head motor $4\frac{3}{4}$ by $5\frac{1}{2}$ inches with three bearing crankshaft and camshafts. The leather-faced cone clutch and the characteristic Stutz rear axle gearset which has been used by this company since its inception are unchanged. In the matter



The long rear springs on the new Stutz, here shown deflected, lie perfectly flat when the car is loaded



The carburetor of the new Stutz has been raised and a hot water jacket fitted to the manifold

of shifting gears, however, there is an alteration in that the shifting lever positions are reversed to what they were on previous models. With the former construction the high-gear position was on the inside and toward the driver. This position was slightly inconvenient inasmuch as the lever was in the way of the driver's leg. The change has been, as stated above, to reverse the shifting positions so that now the lever, when in high, is toward the body and out of the way. A padlock for locking the shifting lever in neutral has been added.

Returning to the motor; as in previous models, the camshafts operate roller type push rods and the valves, which are tungsten steel $2\frac{1}{4}$ inches in the clear, having the mechanism inclosed by individual housings. The camshaft is by helical gearing. Lubrication is by force feed through a hollow crankshaft, carburetion by a Stromberg and ignition by Bosch double distributor magneto with a Remy system taking care of starting and lighting.

Adjustable Clutch Pedals

The clutch pedals may be adjusted to suit the driver's requirements, there being a variation length of $2\frac{1}{2}$ inches. Continuing in the drive, there is an inclosed propeller shaft, the torque tube surrounding it being attached to a face plate back of the clutch. Drive is through two universals and is now practically straight line because of the new spring construction, as has been previously stated.

Upholstering on all new models is either brilliant finished, long-grain, hand-buffed, black leather or dark brown, Spanish hand-buffed leather. The fenders are now slightly crowned which adds to the appearance of the assembly. Battleship gray and Mercedes red are the new standard colors. Stutz has now departed from the use of wood wheels altogether and will furnish Houk wire wheels only, size 34 by $4\frac{1}{2}$, one extra wheel going as regular equipment without additional cost. In tires an option of either Goodrich Silver-

town cord or Goodyear cord are offered. Accessories include a Boyce Moto-Meter, windshield spotlight and double bulb lamps with the small bulb out of focus to comply with dimmer ordinances.

URNS TABLES ON OFFICER

Stevens Point, Wis., Aug. 1—G. W. Andrae, a leading hotelkeeper of Stevens Point, Wis., turned the tables on a mounted policeman who caused his arrest for violating the speed laws. Shortly after leaving court, Mr. Andrae swore out a warrant against the motorcycle officer, charging that he made a wrong street corner turn and exceeded the speed limits when he was not pursuing an offender. The "cop" paid a fine and costs in the same court.

S-B OPTIONAL COLOR SCHEME

The Scripps-Booth Co. has evolved a plan which gives car buyers a wide range of color choice while retaining standardization so that cars are not held up in the finishing department. The plan gives the buyer the choice of two standard finishes, blue-black with white trimming and Scripps-Booth gray, and each month a certain number of bodies are finished in some other color and these are furnished at slight additional cost.

A person buying early in the month often has a choice of four finishes as there are occasionally special finished bodies left over from the preceding month. For instance, the special color in June was azure blue and in July, maroon. Several of the blue bodies made in June were not ordered and as a result, early purchasers in July had a choice of either of the standard finishes or maroon or azure blue.

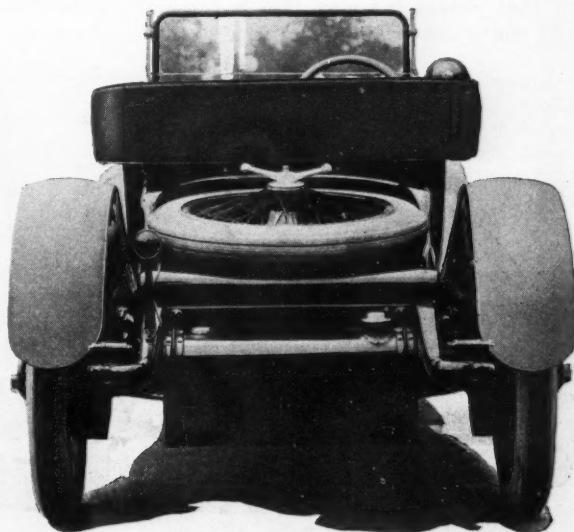
The color plans are laid out several months ahead and a person wanting one of the special colors can arrange for de-

livery during that month. While a slight extra charge is made for the special color, it is a great deal less than for specially finishing the body to order.

TRACTOR RATING DESIRED

Wichita, Kan., July 31—Special telegram—The National Gas Engine Association has appointed a tractor ratings committee which will seek to standardize methods of rating farm tractors both as to drawbar pull and belt horsepower. The drawbar rating favored is in pounds pull with the time element incorporated. The belt power will be in terms of horsepower. The committee will endeavor to evolve a method which will be satisfactory to all manufacturers.

Through the Utah system of convict labor, the Utah State highway is to be completed from the capital down to the southern boundary within the next few years and a great deal of this concrete highway is in already. In the dedicatory caravan there are to be the governors of California, Arizona, Nevada and the governor of Utah is to meet the caravan at the line and escort the visiting motorists to the Utah capital.



Rear end of the new Stutz roadster showing location of extra wheel and method of carrying

Fashionable Curves in Bodies of New H-A-L Twelves

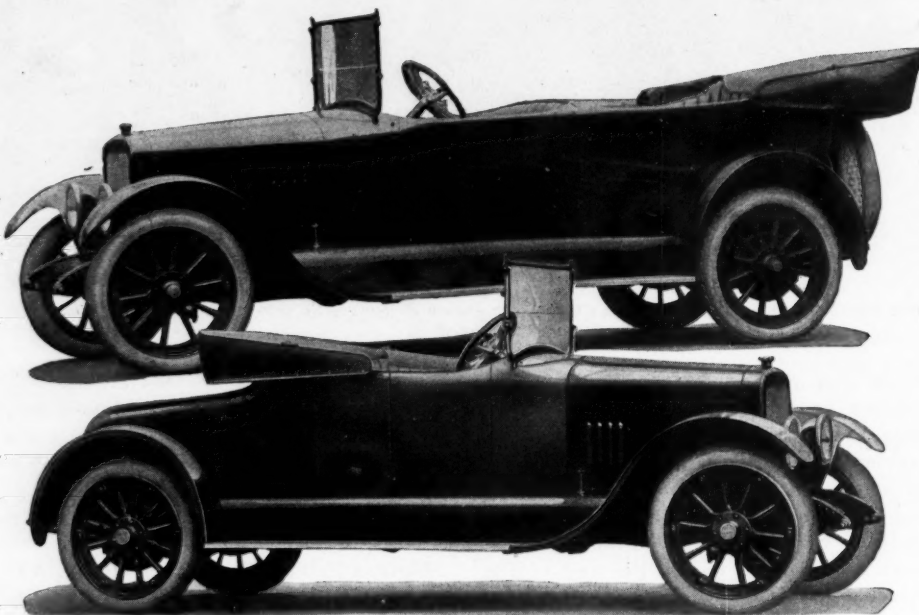
Overhead Valve Motor With Opposite Cylinder Blocks Arranged With 1 1/2 Inch Offset

ALTHOUGH preliminary information regarding the H-A-L twelve was given out some time ago, the R. A. Lozier Co., Cleveland, the maker, is just now getting into production and complete details of the new twelve-cylinder vehicle have therefore been put before the public. Indeed, the preliminary work has taken many months, and the beauty and mechanical excellence of the vehicle are evidence of the fact that some careful thought has been put on the new creation in order that it will meet the exacting demands of a public that is now accustomed to get a great deal for its money when it buys a car. The H-A-L price is \$2,100 in either of the body styles.

Body fashion designers have decreed that the ultra in body lines are the straight taper from radiator to rear of car, with no break at the hood; they have said that the cowl effect at the back of the front seat is necessary; they have made it clear that the top edge of the body must be rounded over. The H-A-L exhibits all of these fashionable curves, and as its wheelbase is 135 in., there is ample room for carrying out the smooth, sloping lines without having any appearance of "squattiness." At the present time two body types are offered, these being the seven-passenger touring car and the roadster.

Mechanical Features

Mechanically the H-A-L is possessed of an overhead-valve twelve-cylinder engine with a bore of 2 3/4 inches and a stroke of 5 inches and the drive is taken through a disk clutch, three-speed gearset and open drive shaft fitted with two universals. The final drive is a Timken floating axle, and the rear suspension is by semi-elliptic springs. Sturdiness of chassis construction is one of the things about the new car that strikes the man who is familiar with motor cars. The frame is a straight



Both touring cars and roadsters of the H-A-L have a 135-inch wheelbase

tapered affair that is reinforced by large cross members, and the wheel equipment is ample for the car's weight, the tires being 34 by 4 1/2.

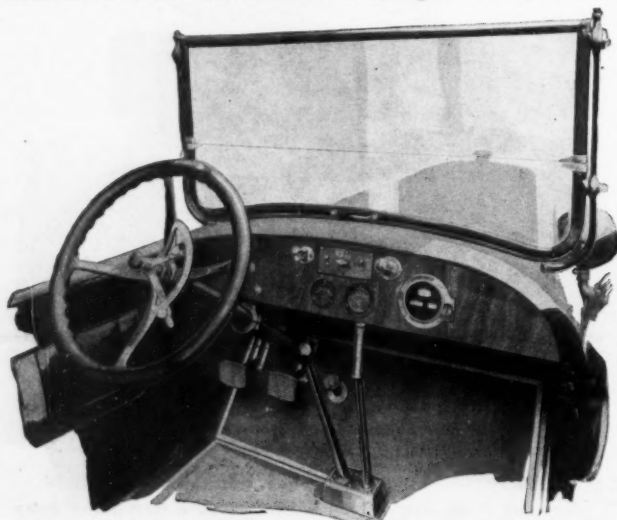
The most important unit of any car is the engine, and H-A-L seems to have made a happy selection of a powerplant that is of good proportions for the type and size of car. It develops, according to formula rating, 39.6-horsepower, but this is merely a nominal figure, for it is claimed that the engine will deliver 70-horsepower at 2,000 revolutions per minute, and that the maximum to obtain is well over 90-horsepower. The dimensions give a displacement of 389.6 cubic inches, which indicates better than any other figure the size and power possibilities of the motor. In general, however, there are no out-of-the-way ideas incorporated in the powerplant, it is conventional in most respects and built upon tried-out lines.

In its general arrangement, the powerplant is of the type in which the cylinders are cast in two blocks of six, and though it is necessary in a twelve to set the cylinders at an angle of 60 degrees to one another, this is of no serious moment, as the valve-in-head construction revolves them from the V. Practically the only thing between the blocks is the carbureter, which is a commendable construction. The

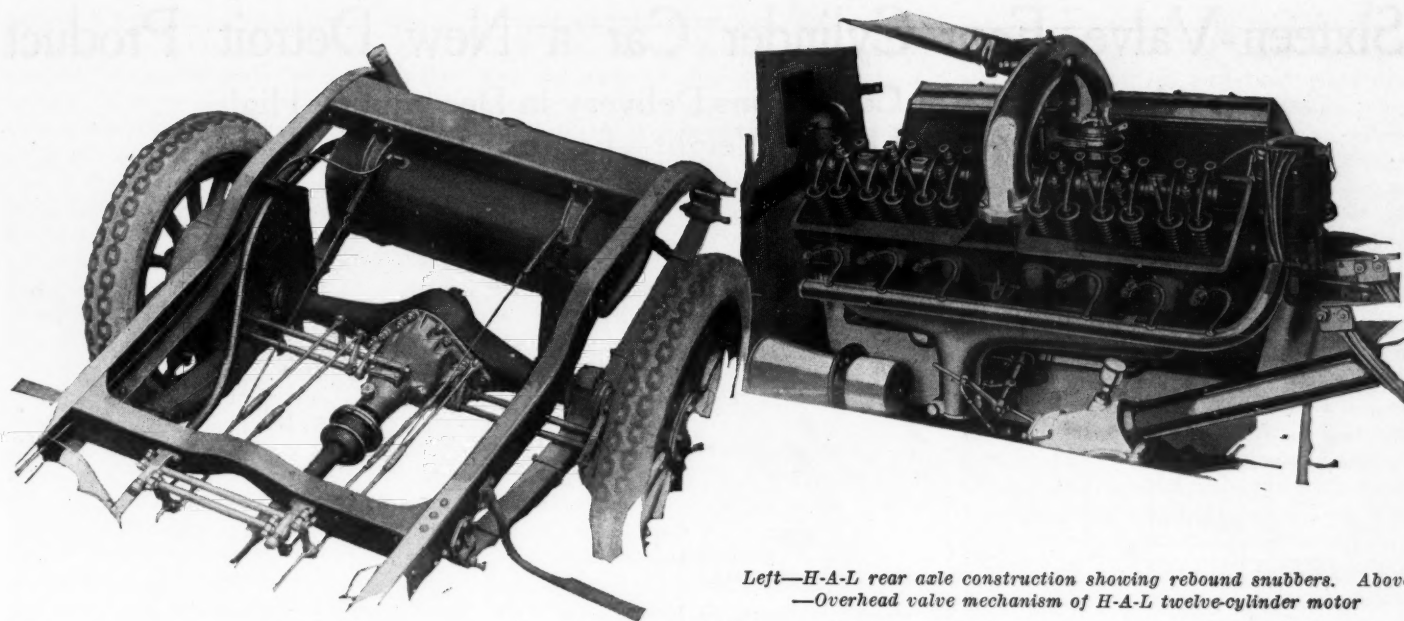
valves are enclosed by cover plates, four in number, each housing in the valve mechanism for three cylinders.

On the right side of the engine are located both the starting motor, the generator and the water pump. Thus only one extra driving gear is required besides the timing gears. The fan is driven by a pulley on the front of the generator and water pump shaft, and at the rear of the crankcase just back of the cylinder blocks is the vertically-mounted ignition distributor of Remy make. This is driven from the rear end of the camshaft by a helical gear. The position of these units leaves ample room for the exhaust manifold for the right block, hence the layout seems to provide for every requirement without giving the appearance of having to squeeze any unit in.

So much for the general layout. Internally, the design is very sturdy in every respect. The cylinder blocks are arranged with 1 1/2-inch offset from one another, which allows the type of lower connecting-rod bearing construction in which the rods, or two opposite cylinders are arranged side-by-side on the same bearing. Due to the fact that the cylinders are offset, it is possible for each tappet to have its own individual cam, which construction, while it complicates the camshaft itself, really simplifies the lower valve construction and allows for proper valve timing, since it is not necessary to consider more than one valve in the shaping of each cam. Pistons are quite long and have chamfered heads which should assist in keeping the oil down out of the combustion chambers,



Clean, graceful instrument board on the H-A-L



Left—H-A-L rear axle construction showing rebound snubbers. Above
—Overhead valve mechanism of H-A-L twelve-cylinder motor

since there is a tendency of the lubricant to ride by the piston head instead of being scraped into the combustion chamber as might be the case if the upper edge of the head were not of this beveled form.

In addition to the rings at the top of the piston, there is one ring near the bottom which acts as a wiping ring and also is a factor working against a smoky motor. The pistons, by the way, are made of cast iron, as the designer of this engine is among those not in favor of the modern tendency toward aluminum pistons. The fact that the aluminum piston, due to its different coefficient of expansion from that of cast iron, requires a somewhat larger clearance than the cast iron piston, works against it in the mind of the designer of this motor.

An elaborate oiling system has been provided for the motor, with the oil pump in the crankcase forcing a constant supply through individual pipes to each of the three main bearings of the crankshaft, and also to the camshaft bearing. The connecting-rods are oiled from the main bearings through holes drilled in the webs of the crankshaft. There is sufficient oil thrown off from the sides of the connecting rod lower ends to lubricate the cylinder walls, this oil being virtually a vapor, due to the rapid revolving of the crankshaft. A special lead runs to the timing gears and the oil breather and filler pipe is mounted at the front of the motor, directly ahead of the left cylinder block, being brought up high enough so that filling is very convenient.

This motor is arranged so that the water outlet connection is combined with the intake manifold, which bridges the gap between the cylinders and from which the carbureter is suspended. Thus the heated water from the cylinders passes around the inner pipe which carries the fuel to the cylinders and good vaporization of the gas results. The belt-driven fan is mounted on a bracket attached to the crankcase and

there is a simple adjustment for the belt tension.

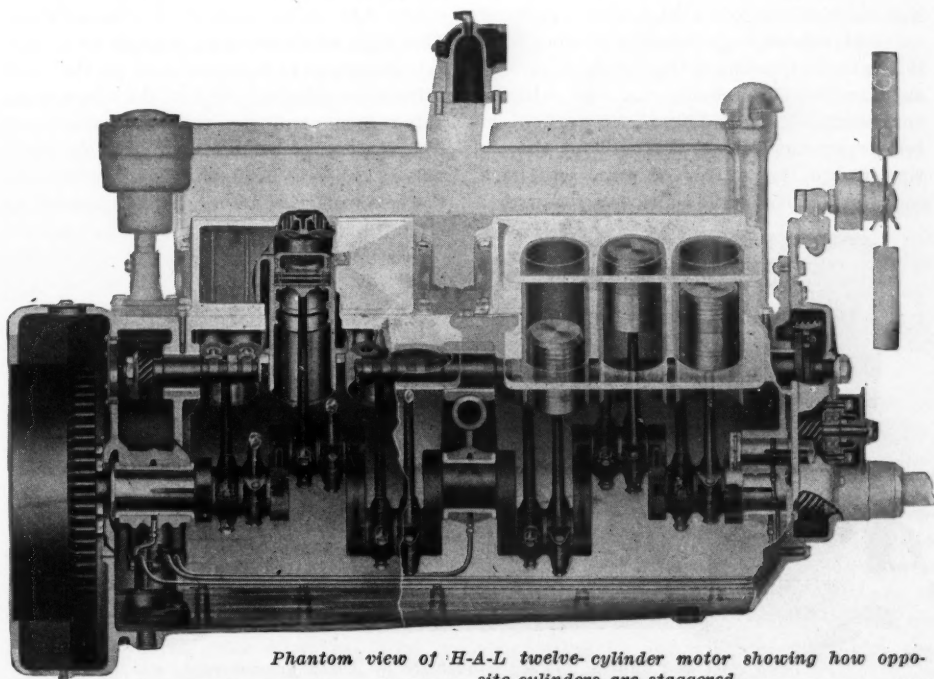
Electrical units for starting and lighting are Westinghouse make and these together with the Remy distributor utilize a 100-ampere-hour Gould storage battery, carried on the right side of the chassis and reached through the floor-board of the front compartment. The location of the distributor is such that the ignition wires running from the spark plugs are quite short, and as the plugs are mounted on the outside of the cylinder blocks, wiring manifolds are fitted, which prevent the wires falling down on the exhaust pipes below them. The starting motor drives through gear connection with teeth cut in the flywheel rim in the usual way.

Compactly attached to the rear of the crankcase is the multiple disk clutch and three-speed gearsets, the bell housing of which completely encloses the flywheel and

clutch mechanism, as well as carrying the brake and clutch pedal shafts.

The clutch is of the dry disk type and is made up of one steel disk and two other disks faced with Raybestos friction material, all three disks being 12 inches in diameter and having a face width of 1 1/4 inches. It is stated that the clutch is so simply constructed that once it is properly adjusted at the factory, it requires no further attention. On the left side of the gearcase is mounted a single cylinder tire pump which is driven by one of the counter shaft gears meshing with the pump gear. To throw the pump into driving engagement, there is a key located in the floor in front of the driver's seat. Then just back of the gearbox on the drive shaft is mounted the speedometer driving gear, meshing with the flexible speedometer

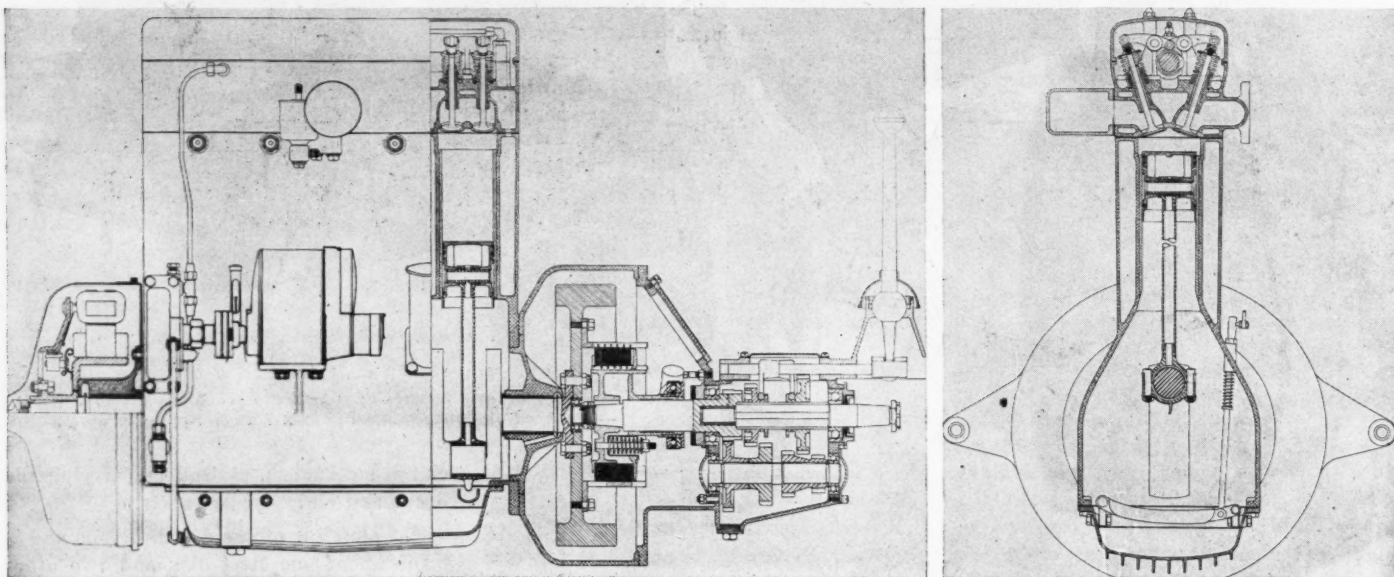
(Continued on Page 43)



Phantom view of H-A-L twelve-cylinder motor showing how opposite cylinders are staggered.

Sixteen-Valve Four-Cylinder Car a New Detroit Product

Aland Motor Car Co., Begins Delivery in December—High Power and Light Weight—Feature Vehicle



Sketches of side and front view of Aland sixteen-valve motor

FOR the last few months there has been considerable talk of the sixteen-valve four-cylinder cars and the latest of these to be mentioned is the Aland, made by the Aland Motor Car Co., Detroit, Mich. This concern is just organized and expects to be in such a position as to start manufacture about the first of December. The company is incorporated under the laws of Michigan with a total capital of \$500,000.

One Chassis Model

The line will be made up of one chassis model with several body styles, but production will first be started on a five-passenger touring and a two-passenger roadster. The paramount feature of the design is the use of a high-speed sixteen-valve aluminum engine and in keeping with the intention to have the weight as low as possible throughout, the car will be characterized by a liberal use of high-tensile strength steel. Throughout the entire design the matter of price will be a secondary consideration and as a result this

has not been definitely fixed although in all probabilities the car will retail for about \$1500.

While rated at 14 horsepower according to the S. A. E. formula, the manufacturer states that the engine will develop more than 65 horsepower at 3,200 r. p. m. The cylinders are cast in a single block and carried to the crankcase as an integral part. This is an aluminum casting and the cylinder walls are provided with cast-iron sleeves which are pressed into place. The bore of the engine is 3 inches and the stroke $5\frac{1}{2}$, giving a piston displacement of 155.5 cubic inches or, according to the rating of the maker, 1 horsepower from every 2.39 cubic inches of displacement. This high efficiency is explained by a careful attention to balance and to the high volumetric efficiency due to the extra large valve areas and the fact that there are four valves per cylinder. Each of these valves is $1\frac{1}{8}$ inches and opens directly into the combustion chamber, being operated by

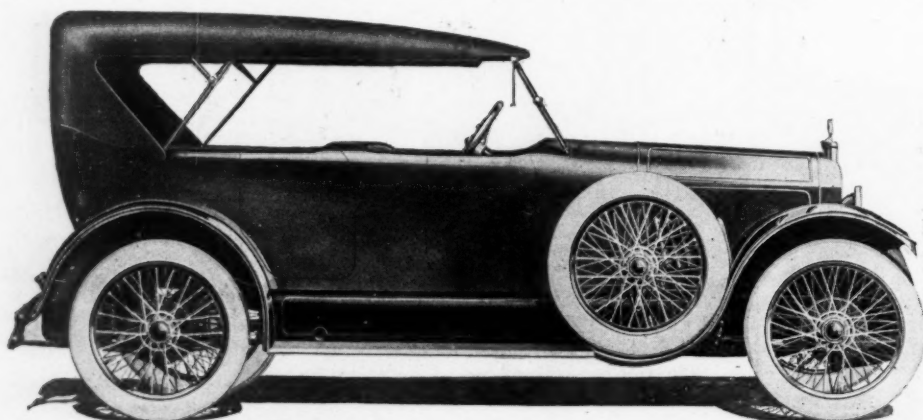
an overhead camshaft which is located in the alley between the valves. One cam operates two valves through double rocker arms which are provided with roller followers at both ends to minimize friction. The rockers are offset 2 to 1 so that while the cam lifts the rocker but $\frac{3}{8}$ inches, the valve is lifted $\frac{3}{4}$ inches.

An aluminum alloy casting is also used for the cylinder heads. It is held in place on the cylinder block with twelve studs. This cylinder-head casting contains the valves, springs, guides, brackets, camshaft, etc., and forms a separate unit which can be removed without disturbing any adjustment. This enables the repair man to grind the valves on the work bench. A feature of importance is that the entire valve mechanism runs in a bath of oil and is protected from dust by means of an aluminum cover which fits over the entire top of the engine block.

Aluminum-Alloy Pistons

Aluminum alloy is used for the pistons, which are provided with three rings, two above and one below the wrist pin. A groove is cut in the piston below the bottom upper ring with six small holes drilled into this as an extra precaution against superfluous oil in the combustion chamber which would cause smoking and fouling of the plugs.

A nickel-steel wrist pin is used and this is free to oscillate in either the connection rod or the piston. A small steel ring fits into a groove on either side of the wrist pin and prevents it from working out to one side and scoring the cylinder wall. The upper end of the connecting rod is provided with a bronze bushing and the connecting rods themselves are of the feather-



Deep cowl and built-in folding windshield in Aland five-passenger car

weight tubular type made from chrome vanadium steel. In manufacture, it is purposed to pay particular attention to the balance of these parts and also to make them secure against breakage. Nickel steel bolts are used to hold the cap on the lower end of the connecting rod and throughout the sections are such as to provide a good factor of safety.

Three bearings support the crankshaft. This is of chrome vanadium steel heat treated and balanced so as to be in running equilibrium at 4,000 r. p. m. The shaft is machined all over and at the rear is fitted to a cast-iron flywheel while in front is the U. S. L. starting and lighting system, which is not in this case a flywheel installation. It is stated that this layout permits this motor to turn up to more than 3,600 r. p. m. The unusual installation of the U. S. L. starting and lighting system on the front end of the crankshaft is quite accessible and in this case a stamped steel housing incloses it.

Pressure Lubrication

Naturally with such a high-speed motor, lubrication has been carefully studied. Oil is first pumped from the cast aluminum pan which has a capacity of 6 quarts, to a distributor tube cast integral with the cylinder block. On the top of this tube is located the pressure regulator for the overhead compartment and a small tube delivers oil to the camshaft bearings and other valve parts. A vertical lead directly over the center crankshaft bearing carries the oil back from the overhead compartment to the crankshaft lubricating the center bearing. In addition there are adjustable troughs beneath the crank throw which take care of the wearing surfaces within the motor and the front and rear main bearings are oiled by separate leads from the oil-pump distributor. Beneath the troughs and extending the entire length of the crankcase is a strainer which is readily removable for cleaning.

Three-point suspension is used with each point allowed to move as it is mounted on a swivel. The two rear points are fastened to the steel stamped supports by means of self-lubricating bolts. The front end is bolted to a cross member at the center and the flywheel is completely housed within the cast aluminum bell housing, the gearbox and clutch case bolting directly to this to form a complete unit power plant.

A Raybestos-faced multiple-disk clutch is used with alternate disks of steel. The clutch release is provided with a ball-bearing so that only light pressure is needed to release the clutch. The gearbox is a three-speed type and with gears and shafts of chrome-nickel steel. The shafts are mounted in large double-row, self-aligning ball bearings.

From the gearbox, the drive is taken to the rear axle through a large-diameter nickel steel tube with universal joints at each end, both propulsion and torque being taken in Hotchkiss style through the springs. The rear axle is semi-floating and

is equipped throughout with Timken bearings. The driving gears are spiral-bevel and are made of chrome-nickel steel. A bearing is located on either side of the pinion giving a substantial mounting and also shortening the pinion shaft and decreasing the amount of axial movement of the rear universal joint in transmitting the torque strains.

A bottle-neck frame is used allowing a wide rear which conforms to the shape of the body sill and narrowed at front to allow for a short turning radius; in fact, the makers state that the car is able to turn about in a radius of 16 feet 4 inches. In carrying out the construction all the frame cross members and brackets are hot-riveted in place, the spring horns at both ends being provided with bronze bushing.

The springs are semi-elliptic all around and are designed to be approximately flat under load. They are of vanadium steel and are provided with bronze bushings. The rear springs are underslung. The springs are attached to the frame by forged shackles and these also are provided with self-lubricating bolts. A full set of shock absorbers is provided as standard equipment.

A departure from conventional practice has been made in the brake design as there is a brake on each wheel, front as well as rear. They are all of equal size and are of the internal expanding type. The left front and right rear are operated by the pedal and are used for service, and the right front and left rear are operated by the hand lever and are used for emergency. The idea of this diagonal braking layout is to eliminate skidding.

Conventional steering is used with worm and full gear and adjustments to take up wear at different points. The steering wheel is an 18-inch walnut knobby grip and the control levers work on a full circle control plate instead of the conventional section.

On this chassis, which has a wheelbase of 122 inches, there will be several types of bodies which will be interchangeable. The five-passenger open touring and the two-passenger touring roadster will be the first in production. The five-passenger design is featured by a deep cowl with a built-in sloping windshield. The body is a double-cowl style and is made of sheet aluminum over a sub-structure of wood. The seats are low and are tilted back to give ample leg room. A great amount of attention has been paid to detail in equipment and the car is provided with five Rudge-Whitworth wire wheels with 33 by 4 tires.

FALLS MACHINE EXPANSION

Chicago, July 29—The Falls Machine Co., Sheboygan Falls, Wis., a large manufacturer of small, high-speed gasoline motors, has passed into the control of a syndicate represented by Andrews & Co., Chicago bankers. The company is to be re-incorporated as the Falls Motor Co., and

the new capital stock will be \$1,500,000.

During the last 8 or 10 months extensive additions have been made and plans are under way for still further extension. The Falls company, in 1913, began the manufacture of motor car engines for the Grant Motor Co., and it is said that the Grant company, during the next 12 months, will use between 15,000 and 18,000 Falls motors.

The Falls Machine Co. was established in Sheboygan Falls, Wis., in 1903, and the net earnings for the year ending December 31, 1915, was \$94,169.43 and for the first 4 months of 1916 was \$40,298.82 or at the rate of \$120,000 per year. Of the new capital \$5,000 will be in 7 per cent accumulative, convertible preferred stock at a par value of \$100 and \$1,000,000 common stock, par value of \$10.

UPHOLDS COLORADO LICENSE LAW

Denver, Col., July 31—Colorado's law requiring a state license each year for motor vehicles has been upheld as constitutional by District Judge Burke, of Sterling, in a decision just handed down in the first suit brought to contest the law since it went into effect 3 years ago. The case was started nearly a year ago when several Logan County car owners refused to pay their license fee. Secretary of State Ramer brought suit to collect the fees, and a justice of peace declared the law unconstitutional. The law requires an annual fee of \$2.50, \$5 and \$10 for cars up to 20 horsepower, 21 to 40, and above 40, respectively.

STEWART WARNER BUYS V-RAY

Chicago, July 31—The Stewart Warner Speedometer Corp. has purchased the V-Ray Spark Plug Co., of Marshalltown, Ia., and will begin the manufacture of V-Ray plugs in the new addition to the Chicago plant of the Stewart corporation. Production will be increased to several thousand a day. V. S. Hanson, president of the V-Ray company, becomes manager of the spark plug department.

NEW MORELAND TRUCK MODEL

Los Angeles, Cal., July 31—The Moreland Motor Truck Co. has announced a new model, a light delivery truck, the chassis to sell at \$990. This new Moreland model is a 1,500 pounds capacity rapid service utility truck equipped with Wisconsin motor, Timken axles and roller bearings, three-speed transmission, and either solid or pneumatic tires are optional.

INVENTS SIX-WHEEL CAR

Paterson, N. J., July 31—Local capital has purchased all the rights of M. A. Mackay, a Maine backwoodsman, to chassis he has invented. This chassis has three axles, six wheels and a 200-inch wheelbase. It will make a complete turn in a space of 32 feet. Both front and rear wheels are controlled by the steering gear and the center wheels are fixed.

High, Narrow Radiator and Straight-Line Body in Briscoe

New Four for 1917 Has Gearless Differential and Elliptic Rear Springs

BRISCOE has a brand new car fitted with a four-cylinder motor and priced at \$625 either with a five-passenger touring body or a four-passenger roadster type. It is a distinctive car in a number of respects, both in chassis design and body arrangements, and undoubtedly the fact that the Briscoe Motor Corp. intends to turn the car out in large quantity has much to do with making it possible to set so low a figure on the new model. In a word, its general make-up stamps it an excellent vehicle for the money.

Following the latest body contour, the new Twenty-four, as it is called, has a rather high and narrow radiator, and a sloping hood and body. There is no transitory curve where hood joins body, and at the cowl, the body is rounded over in line with the present tendencies in body fashions. There is no doubt that body shaping has come to the point where speed is suggested in every curve. The Briscoe designers have evidently caught the idea, for a distinct suggestion of speed and power is given by the lines of the new bodies. Then, a slanting windshield has been fitted, this alone being a sort of finishing touch to a very pleasing general body outline.

105-Inch Wheelbase

The new Briscoe is built on a wheelbase of 105 inches and the space has been commendably utilized to give a surprisingly roomy car. Like most other designers, the Briscoe sponsors have seen to it that the old criticism of not having sufficient leg room in the drive seat to give the driver comfort does not hit their new creation. There seems plenty of leg space for any type of individual.

Looking at the mechanical specifications, we find a $3\frac{1}{8}$ by $5\frac{1}{8}$ four-cylinder block motor having a detachable cylinder head plate that gives access to the valves; an inverted type of cone clutch; three-speed gearset in unit with the rear axle; float-



Looking forward in Briscoe touring model

ing type of rear axle in which is incorporated the Bailey gearless differential; elliptic front and rear springs; tapered frame and 30 by $3\frac{1}{2}$ -inch tires all around.

From the above it will be evident that the motor has quite a long stroke as compared with the bore, the dimensions giving a stroke-bore ratio of 1.64 to 1, which is somewhat greater than the average. The formula accords the engine 15.6 horsepower, but it is capable of over 30 horsepower, this due to the long stroke and general design. A better idea of this may be gained from the fact that while the bore is not large, the long stroke raised the piston displacement to 157.2 cubic inches which figure is a direct indication of the power.

Of the type in which the upper part of the crankcase, which carries the crankshaft and camshaft as well, is in unit with the cylinder block, the motor provides for quick valve accessibility by the use of a detachable plate that extends the length of the top of the casting over the eight valve chambers, this being on the right half of the top. The left part of the top is taken up by the large water outlet con-

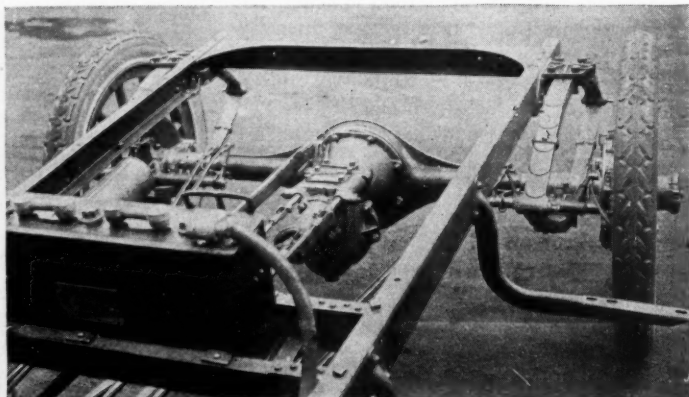
nection which works in conjunction with thermo-syphon cooling. The bottom of the motor is enclosed by a pressed steel pan which acts also as the oil receiver. On the right is carried the Splitdorf gear-driven generator, with the ignition distributor mounted in unit, and on the left is the starting motor, also a Splitdorf unit. It connects to teeth in the flywheel face. The right side being the valve side, the manifolds are placed here, with the carburetor mounted quite high up so that there is little or no interference with the reaching of the tappets.

Splash and Force Feed

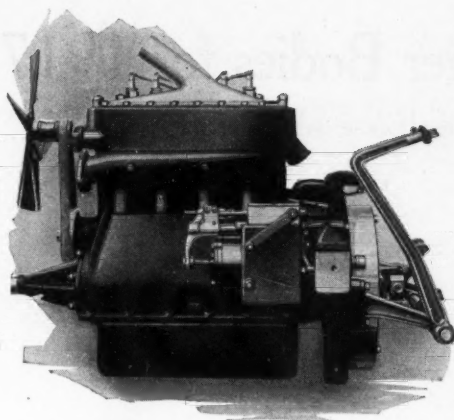
With direct oil feed to the bearings and gears, the lubrication system is a combination of splash and force feed. The oil pump is positioned on the right forward side of the crankcase and is driven off the camshaft. The oil leads to the gears and sight-feed gauge run outside on the right. In accordance with usual practice for this kind of oiling, the troughs under the connecting rods are kept supplied, and the rod ends throw the oil up into the cylinders and onto the various bearing surfaces, from which it eventually drains back into the crankcase. To tell the height of the lubricant in the supply, there are two indicating levers located on the right side of the motor just below the oil pump. There is also an indicator which tells whether or not the oil is flowing as it should. This occupies a rather unusual position in that it protrudes through the toe board within sight of the driver, and ahead of the control levers. Thus it is out of the way and can be readily seen, but the piping is reduced to the minimum, which is a commendable point. The oil filler and breather is in a new place too, it being forward on the right and high up so as to be accessible for oil filling. It enters the cylinder block just below the exhaust manifold, and above the cover plate that houses in the valve tappets.



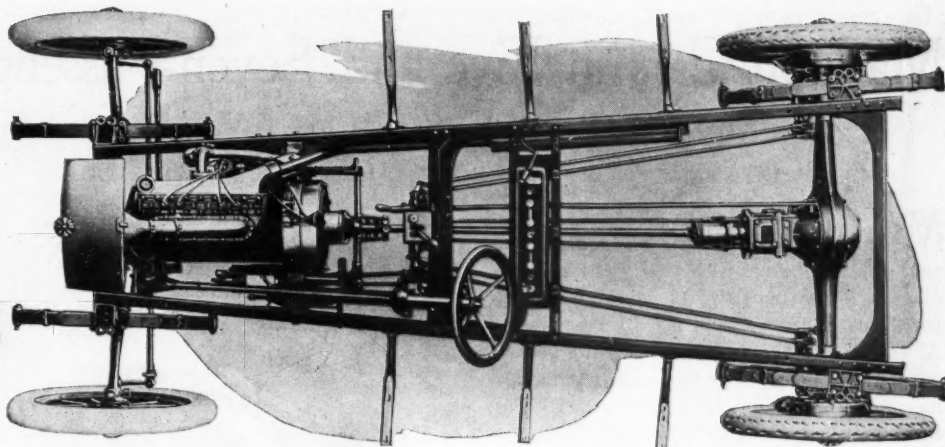
New Briscoe four-passenger body with seat open to allow access to rear compartment



Rear view of 1917 Briscoe chassis, showing unit mounting of gearset and elliptic rear springs



Left side of Briscoe motor, showing starter



Plan view of Briscoe 1917 chassis, showing tapering frame and rear springs set at an angle to it

In its adaptation of the thermo-syphon method of cooling, Briscoe has placed the engine sufficiently low as compared with the radiator to give proper thermal action. To meet further the demands of this simple cooling the radiator top tank is large, and the water flows to it from the large water outlet connection that extends the length of the top of the cylinder casting, as already pointed out. There is also a large water inlet which is attached to the left side of the cylinder block, and extends all along it so as to give good water distribution, and further it is of sufficient size to insure against restriction of the flow. Thermo-syphon cooling is very efficient for motors of this size where it is properly applied, and Briscoe engineers have evidently been fully aware of the possibilities of correct fitting of the system, judging from the free passages, large size, etc. A four-bladed, pressed-steel fan is applied, driving from a pulley on the front end of the camshaft by a flat belt. The fan is mounted in a support that is integral with the cylinder casting, and there is provision for rocking the fan shaft so as to give the right belt tension.

Unusual Generator Drive

Drive of the generator is unusual, for it is from the rear end of the camshaft through gear connection. The generator is positioned close to the flywheel on the valve side of the engine, and the gearing is housed in the extension of the right rear supporting arm of the engine. The ignition distributor sits on the front end of the generator unit, and there is bevel gear driving connection between its vertical shaft and the horizontal armature shaft.

Passing to the clutch, this unit also presents some differences over average practice, principally in the fact that it is of the inverted variety. That is, instead of pulling back from the motor to release, it is shoved toward the cylinders, the action being just the reverse. The cone is leather faced, and is possessed of six spring plungers acting against the under side of the leather at equal intervals to insure easy action and prevent grabbing. As the throwout mechanism must act to push the cone inward when declutching, a simple universal coupling acting directly against the center of the cone and clutch

spring is made possible. A forged arm extends out from either side of the motor support, and the pedal shaft is carried transversely by these arms, the center of this cross shaft having a simple leverage connection with the clutch coupling. The construction should make a pedal action that does not require undue foot pressure, although exerting a multiplied force on the cone.

Back of the clutch there is a universal joint and then the open drive shaft runs directly back to the rear universal that is just ahead of the gearbox. There is a light torsion bar running from the front of the axle housing to the intermediate frame cross member, this assisting in taking the torque and drive. Compactness is very noticeable in the gearbox, which has three speeds, with the countershaft mounted directly below the main shaft. The latter runs on taper roller bearings and ball bearings, while the countershaft is carried on plain bushed bearings. Control rods run parallel with the drive shaft from the H-gate that is attached forward to the intermediate cross member of the frame. These control rods are of quite large diameter, and should not have any tendency to whip, and special provision has been made in their mounting so that there is no likelihood of rattle. Although the pressed-steel rear axle presents no unusual features outwardly, it is fitted with the Bailey gearless differential, which acts, through a series of ratchets and pawls, so that the wheel having the most traction gets the most power, in contradistinction to the standard differential in which the free wheel receives the bulk of the power. This device is now quite well-

known, and needs no lengthy description here. The axle possesses the qualities which put it in the floating class, in which the weight of the car is carried entirely on the axle tubes, with none to be sustained by the axle shafts, they being given the single function of driving the wheels. Hyatt roller bearings carry the axle shafts, acting in conjunction with ball-thrust bearings which care for the thrust.

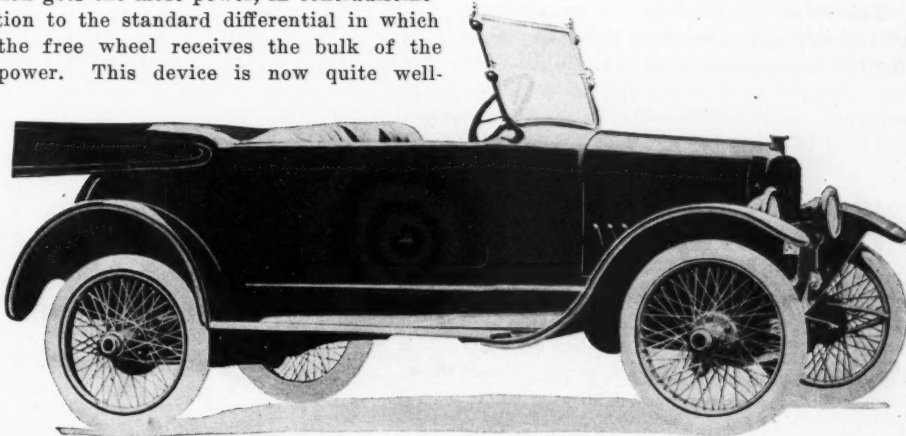
Fashionable Bodies in H-A-L

(Concluded from page 39)

shaft gear which is bracketed to the back side of the gearcase.

Long, flat rear springs of semi-elliptic form are fitted, these being underslung from the axle and taking a flat position under load. They consist of ten plates, 2½ inches wide and are 57 inches long. From this it will be seen that the car should ride very easily, since road shocks tend to force the springs to the reverse side of the horizontal, thus a dampening effect upon the shocks is produced.

In connection with the outward appearance of the car, mention should be made of the distinctive type of radiator used, which is moderately high and narrow and which blends well with the general sloping lines of the car. There are auxiliary tonneau seats which fold into the back of the front seat, and another attractive feature is the symmetrical grouping of the instrument on the board.



1917 Briscoe touring car, which sells for \$625

Madison Cars in Five and Seven-Passenger Bodies for 1917

One Motor Is Two Chassis—One for 115-Inch Wheelbase and the Other for 124-Inch Wheelbase

MADISON cars for the 1917 season will have two body forms, one a five and the other a seven-passenger, fitted to a chassis, known as the 6-40 model, identical for both bodies except as to wheelbase. Alterations in the appearance of the bodies constitute the principal changes, the lines having been made to correspond to the flat cowl design which is so much in vogue in the new models this season.

Powerplants are the same for both the five and seven-passenger model. Rutenber makes the motors. The five-passenger has a wheelbase of 115 inches and the larger car 124 inches. A two-passenger roadster on the smaller wheelbase can also be secured if desired.

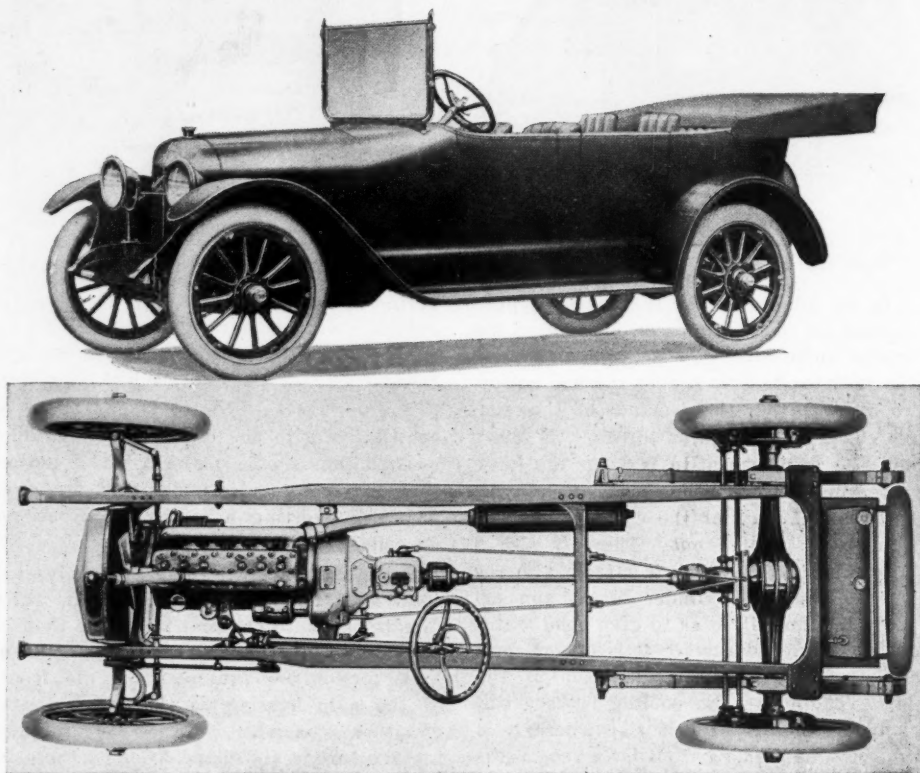
Naturally in using the Rutenber powerplant the improvements made in this during the past year have been incorporated in the Madison engines. The bore is $3\frac{1}{8}$ inches and the stroke 5 inches and the six L-head cylinders are cast in a single block and are integral with the upper half of the crankcase. The valves are inclosed and the cylinder head is detachable.

Three-point suspension is used and the rear support is secured by two legs on the rear of the crankcase casting. The third support is at the forward end of the motor and this is flexible allowing the motor parts to be independent of any weaving of the frame. The pistons are cast iron and are fitted with three rings, two of which are close to the top and the third located just beneath the wrist pin boss. The connecting rods are of I-beam section being drop-forged.

Camshafts on Ball Bearings

Drop-forged camshafts are used, with a diameter of $1\frac{1}{8}$ inches. The cams are integral with the shaft and are hardened and ground being carried in plain bearings at the center and front and at the rear in a double row S. K. F. self-aligning ball bearing. The valves are actuated by mushroom type flat followers which are offset $\frac{1}{8}$ inch to distribute wear.

Two steels are used in the manufacture of the valves, carbon steel being employed for the heads while alloy steel is used for



Above—Madison seven-passenger body with flat cowl design. Below—Madison chassis, top view. Note the length of the rear springs

the stems. The diameter of the valve is $1\frac{1}{8}$ inches in the clear with a $\frac{5}{16}$ inch width. A feature of the valve construction is that the entire valve bracket together with the lifting mechanism can be removed from the engine without disturbing the camshaft. This is done by removing the cover plate and stud nuts and then turning the crankshaft by means of the starting crank until the valves are at their lowest level. In arranging the valve timing the intake opens at 15 degrees after top center and closes 50 degrees after bottom center. The exhaust valve opens at 45 degrees before bottom center and closes 10 degrees after top center. Compression is 75 pounds absolute.

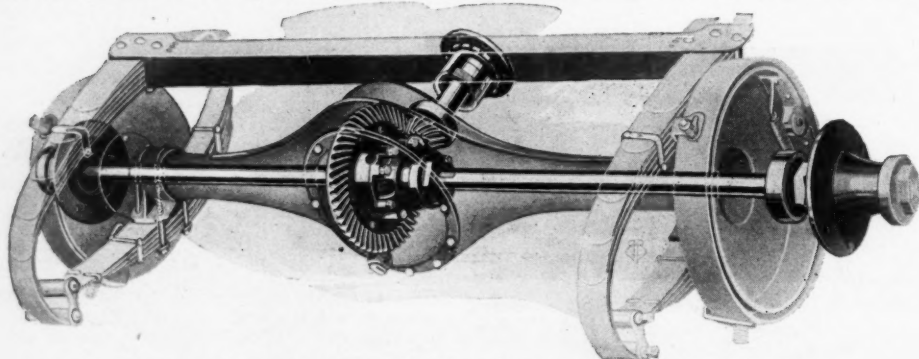
Power is transmitted by means of the Muncie Gear Works dryplate multiple-disk

clutch, which is fitted with alternate disks of asbestos and saw steel. Annular bearings are used in the clutch release and these are lubricated by oil which is allowed to enter from the crankcase since the clutch housing is in direct communication with this part of the motor. The gearbox is a conventional three-speed unit of the selective type.

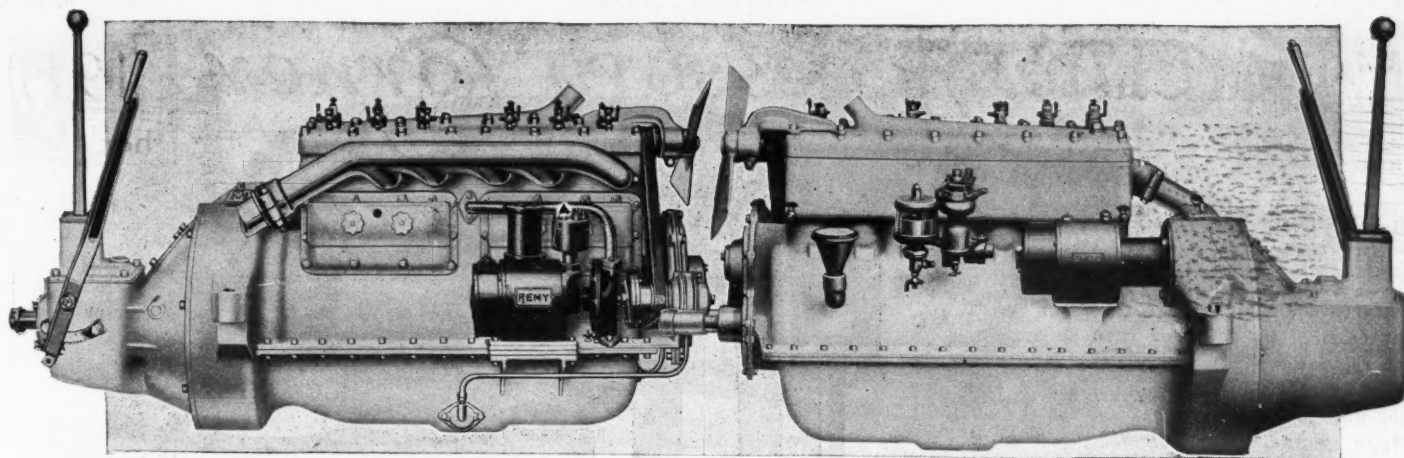
Two universals are used in the drive, the power being taken through the propeller shaft to a floating rear axle fitted with a pressed steel housing and Brown-Lipe, nickel steel spirally-cut gears. The axle shafts are supported on large annular bearings of heavy duty design, and alloy steels are used throughout in the parts carrying the driving and torsion stresses. Hotchkiss drive is used both torque and propulsion being taken through the rear springs.

Remy Throughout

Electrically the Madison cars are Remy throughout. Starting is by an independent series-wound Remy motor used in connection with the Bendix drive for meshing the starting pinion with the flywheel ring gear. For lighting and current supply there is a Remy generator mounted on the right side of the motor and driven directly off the priming set. This generator unit also carries the Remy ignition distributor which is driven through a worm gear from the generator shaft. The gen-



Phantom view to illustrate Madison floating rear axle and spiral gears



Two sides of Madison motor. All equipment is placed high where it is easy to get at

erator also carries the regulator and automatic cut-out operating in connection with the Willard storage battery.

The gasoline system is composed of a 16-gallon tank supplied with a gauge mounted on the rear of the chassis, a Stewart-Warner vacuum system, and a Model M Rayfield carburetor provided with automatic air intake and climatic dash adjustment. Steering is by the T. W. Warner irreversible worm and full gear used with a steering wheel having an 18-inch corrugated rim. The tire equipment is Goodyear 34 by 4 all around with the all-weather non-skid tread on the rear. Three-quarter elliptic underslung rear springs are used and the front are semi-elliptic.

Full equipment is provided and included at the list price. Among the accessories provided with the car are a one-man top made from Neverleak, electric horn, Stewart-Warner speedometer, ventilating and rain-vision windshield, tire carrier, foot and robe rails, trouble lamp and a full tool outfit.

Upholstering is in long grain black enamel leather with deep Turkish type cushions. On the five-passenger body a single front seat and rear seat are used, while on the seven-passenger the boat-shaped design is carried out with divided front seats and auxiliary seats which fold against the backs of the front seats entirely out of the way when not in use. The Madison standard body color is Richelieu blue.

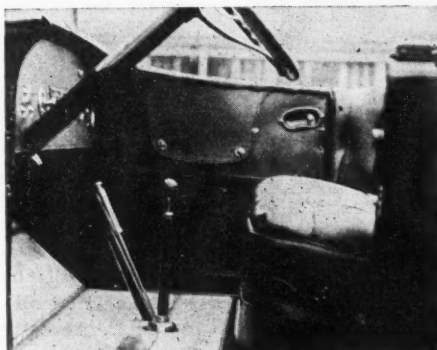
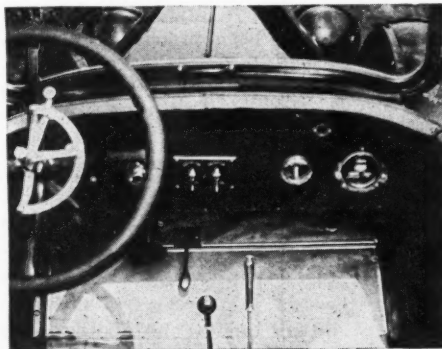
FRANCE REPEALS IMPORT BAN

Paris, July 15—Prohibition of the importation of motor cars into French territory, adopted at the beginning of May, has been repealed by the French authorities, and an import duty of 70 per cent of the value has been imposed. The important feature of the new law is that it applies to motor cars—complete vehicles, chassis, or chassis without motors—weighing 500 kilos to 2,500 kilos or less than 500 kilos. Thus vehicles weighing more than 2½ tons are about 10 per cent of the value.

It is evident that this change has been made in order to satisfy government contractors, who maintain they are unable to

carry on their work without trucks. To have allowed the importation of commercial vehicles while shutting out passenger cars would have raised the difficult problem of what constituted a commercial car. England has tried to do this and found the matter a thorny one, for in the case of many chassis it is impossible to say whether they will be used for touring or for business. By fixing a weight limit, only 3- to 5-ton trucks can be imported, but it is just this class of vehicles which is required in France at the present time. American truck representatives on the French market are quite satisfied with the change, for they are now able to meet the fairly healthy demand.

Touring car representatives are badly hit. Already high freight and an unfavorable rate of exchange have driven up the price of American cars, and with a 70 per cent duty in addition it will be impos-



Plenty of leg room and a comfortable slanting cushion in the front compartment of Madison. Control equipment of 1917 Madison

sible to do business. While there is no French competition, Ford may be able to keep on the market, but the agents for more expensive cars admit that they will have to close as soon as present stocks have sold. This will particularly affect Buick, Overland and Dodge, who have been active on the French market for the last few years.

STUDEBAKER DIVIDENDS

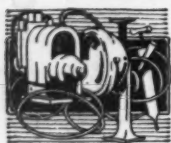
South Bend, Ind., Aug. 1—Special Telegram—Studebaker Corp. directors at a meeting in South Bend, today, declared regular quarterly dividends of 1¼ per cent on the preferred and 2½ per cent on the common stock, payable September 1. Heretofore the quarterly dividends have been 1½ per cent plus 1 per cent extra. At the end of the first 6 months of the fiscal year to June 30, net profits were \$6,028,329. After deducting the 7 per cent dividends for preferred stock this figures at 18.8 per cent on the common outstanding and is at the rate of 37.6 per cent for the year.

JACKSON JOINS WILLYS-OVERLAND

Toledo, O., July 31—E. B. Jackson, formerly president of the New York branch of the Packard Motor Car Co., has become identified in an executive capacity with the Willys-Overland Co. as assistant to C. A. Earl, vice-president of that organization. Temporarily, at least, Mr. Jackson will devote his time to completing the extensive metropolitan organization which the Willys-Overland Co. is building up for its New York trade. More than \$1,000,000 is being expended by the Overland company on its New York branch and when completed it is to outrank anything of its kind in the world, both in size and equipment.

FISHER BODY EXPANDS

Detroit, Mich., July 31—To care for further expansion, the Fisher Body Co., already the largest body manufacturing concern in the world, is preparing to float an issue of \$5,000,000 of preferred stock through Hallgarten & Co., New York bankers.



The Accessory Corner



Heating System for Garages

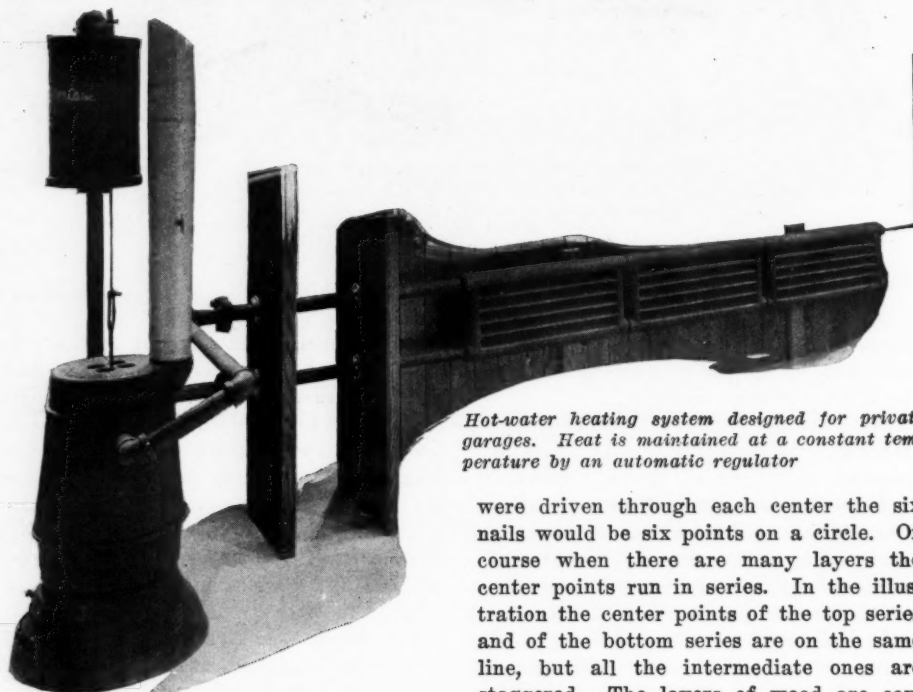
THE Wasco is a hot-water garage heating system and is designed for private garages containing space for from one to six cars. It is equipped with an automatic regulator which compels a steady heat under varying climatic conditions. A one-car garage Wasco system just fits the average garage, 10 by 12 feet, for wider garages there are two, three, four or five radiators. The complete outfit consists of an all-cast-iron hot-water heater, radiator and water cylinder in one piece, pipes in stock sizes cut to fit. The heater burns soft coal and anthracite of pea, chestnut or stove size. Prices range from \$35 to \$75 depending on the size of the garage to be heated. W. A. Schleit Mfg. Co., Inc., Syracuse, N. Y., is the manufacturer.

Vaporizer for Kerosene

C. W. Lundy, Malad, Idaho, has perfected a device by the use of which, he claims, any motor may be run on kerosene, alcohol or even crude oil. Furthermore the claim is made that the vaporizer will increase the gasoline mileage very nearly 50 per cent, and that carbon deposits are practically eliminated. The device takes the place of the intake manifold and utilizes the entire exhaust for heating the gases. Gas from the carburetor passes through small tubes within a barrel. These tubes are very thin and surrounded by the heat from the exhaust are almost instantly heated to a temperature at which, the maker claims, kerosene or even heavier oils, readily vaporize.

Ventilating Hood Holder

The V Air Valve and Mfg. Co., Denver, makes a ventilating hood holder which permits the free circulation of air beneath the Ford hood. These holders are substituted for the standard Ford clamps, and allow the hood to be clamped in an elevated position. The forced draft caused by the motion of the car passes over the motor, and escapes at the rear. The run-



Hot-water heating system designed for private garages. Heat is maintained at a constant temperature by an automatic regulator

ning temperature of the engine is lowered, and the performance of the engine is bettered, it is claimed. In cool weather the hood may be locked in the closed position. The price per set of four is \$4.50.

Laminated Wood Wheel

The latest idea in wheel building is to use laminated wood, the wheel appearing as a solid disk like a pressed steel wheel. This design has been produced by F. S. Merrill, Amesbury, Mass., Mr. Merrill being head of a firm that has been 55 years in the wheel building business. The principal claims for the new wheel are immense strength, moderate weight and handsome appearance. The wheel is built up in a very ingenious manner. Wood is cut into triangular pieces so that a number of triangles put together make up a circular sheet of wood. Several such circles are laid on top of one another, but

the centers or places where the peaks of the triangles meet are not on a single center line. Suppose there are six layers of wood, then the center points of the six triangle assemblies will be spaced equally apart. Actually the points are arranged around a small circle, so that, if a nail

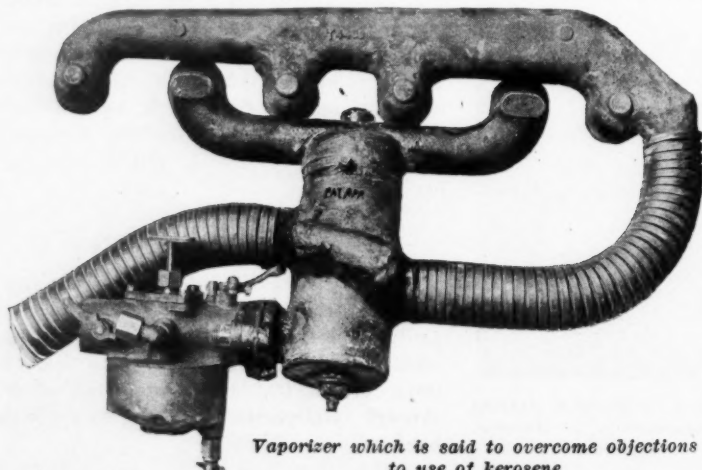
were driven through each center the six nails would be six points on a circle. Of course when there are many layers the center points run in series. In the illustration the center points of the top series and of the bottom series are on the same line, but all the intermediate ones are staggered. The layers of wood are consolidated by heavy pressure. The inventor points out that this wheel, of which the strength is obvious, lends itself admirably to decorative painting. In natural wood it looks well, having none of that heavy appearance which often characterizes a disk wheel of steel. The wheels are at present obtainable by individual order at a cost of \$175 per set of four, painted and finished in any style.

Radiator Cap Top for Fords

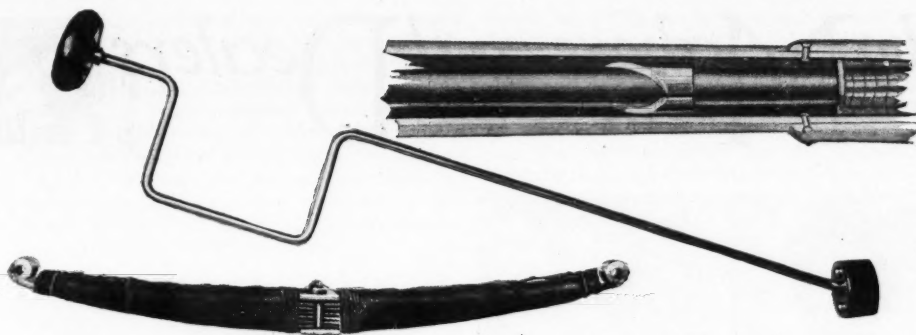
A composition cap top that is fastened to the top of the Ford radiator cap is being marketed by C. E. Bridges, 4537 N. Whipple street, Chicago. After drilling a small hole in the top of the Ford cap, the composition cap is secured by means of a screw. A fiber washer is placed under the head of the screw to prevent the escape of steam. This cap top is a non-conductor of heat, and improves the appearance of the car, it is said. The list price is 25 cents.

New Type of Spring

A motor car spring which the inventor claims is more satisfactory than and able to take the place of both elliptical and cantilever type springs has been brought out by P. B. Hummel and marketed by Hummel & Hummel, New York City. The spring is patented and according to its inventor is entirely void of rebound action. The illustration herewith will explain its action. The spring is shown in both side elevation and front elevation. A is the dead axle, B is a portion of the vehicle body, C a pair of springs or sets of springs arranged in diverging relation, D an abutment for supporting the springs. The action is explained as follows: Upon the



Vaporizer which is said to overcome objections to use of kerosene



Above—L. & L. grease retainer to keep grease from Ford brake shoes, manufactured by John C. Hoof & Co., First National Bank Building, Chicago. Center—Universal valve grinder for owner's use. Below—Boot lubricator for springs

vehicle meeting an obstruction or unevenness in the roadbed the wedge E is forced downwards below its normal location but gradually returns to its normal position without rebound or shock. It is stated that the absorbing qualities of the spring are exceptional when it is placed in a plane with the motion of the car.

High-Speed Camshafts for Fords

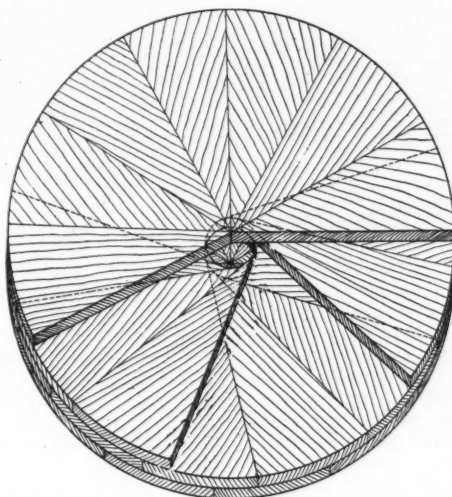
D. F. Noonan Mfg. Co., Paris, Ill., is marketing a specially designed camshaft for Ford speedsters. The valves are lifted slightly higher than by the standard Ford camshaft, and the intake is opened before the exhaust closes. The intake valves are opened 5 degrees before center, and closed 40 degrees after center. The exhaust opens 51 degrees before center and closes 18 degrees after center. With a 3 to 1 gear ratio, a speed of 72 miles per hour has been claimed for a Ford equipped with one of these camshafts. The price is \$12.50.

Resistoll Air Hose

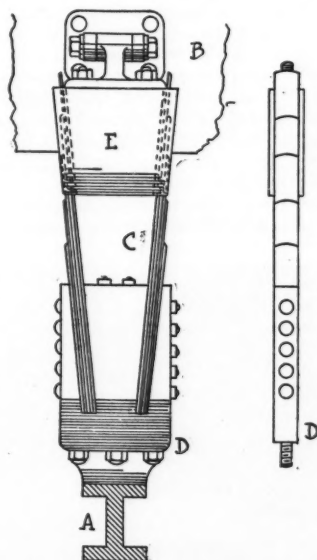
A compression air hose having special oil resisting qualities is manufactured by the Brunner Mfg. Co., Utica, N. Y. The walls are made up similar to the common 5-ply hose, which it resembles in outward appearance. The interior of the hose is lined with a special compound that is said to have oil resisting properties, and to resist the action of any oil or oil fumes that may be in the air. Prices are: $\frac{3}{8}$ -inch inside diameter, 16 cents per foot; $\frac{1}{4}$ -inch inside diameter, 18 cents per foot; $\frac{1}{2}$ -inch inside diameter, 27 cents per foot.

Welding and Cutting Torch

The Oxy-Acetylene Products Co., 810 Diversey Parkway, Chicago, manufacturer of oxy-acetylene welding apparatus, has recently perfected a torch for welding and cutting of metals. With this torch it is possible to do any class of welding from the largest to the smallest jobs. The one torch can be adjusted to many different sizes and shapes, or in other words, the operator may adjust the torch to meet conditions. It is easily changed from a welding torch to a cutting torch. The head is blockcast and requires no tips, which makes it a positive leak-proof head. The cutting head is adjustable to two different positions, one being a regular right angle torch and the other a straight-ahead cutting torch. These adjustable features allow this torch to do work that would re-



Ingenious method of matching wood in novel laminated wheel



New type of spring for motor car use

quire five different style torches to accomplish. Different sized heads are used, instead of tips, where different thicknesses of metals are cut. In other words, it is only necessary to change the easily removable heads to perform any work.

Boot Lubricator for Springs

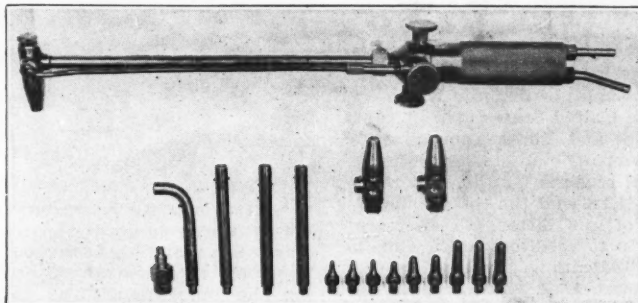
Major's spring lubricator is something new in the line of a combination oiling medium and dust boot for motor car springs. The boot is a waterproof casing lined with felt. The lining is oil saturated and the boot is laced onto the spring. Every time the leaves move they draw more oil between them from the felt. Furthermore, it is claimed that the oil passing between the spring leaves is free from road dust, grit and dirt inasmuch as the constructing of the boot is such that it is impossible for these things to enter. The Major Mfg. Co., 461 Pearl street, New York City, is the manufacturer. Prices per set of four are as follows: Runabout or five-passenger car, \$20; seven-passenger car, \$25; Ford, \$12.

Valve Grinder for Owner's Use

For the car owner who would grind his own valves there has recently been brought out a handy tool for this purpose. It is designed with the idea to make it easy for any one to grind valves accurately, and particularly in cars with valves located in inaccessible places. The device, which resembles a carpenter's brace, has a cast, adjustable head with steel pins to engage the valve and the brace has a ball and socket joint which gives it the necessary clearance. The brace part, including the breast plate, is entirely of steel and there is practically nothing to wear out. Siegel and Andrews, 4 Academy street, Amsterdam, N. Y., are marketing the device for a list price of \$1.

Comet Dash and Trouble Lamp

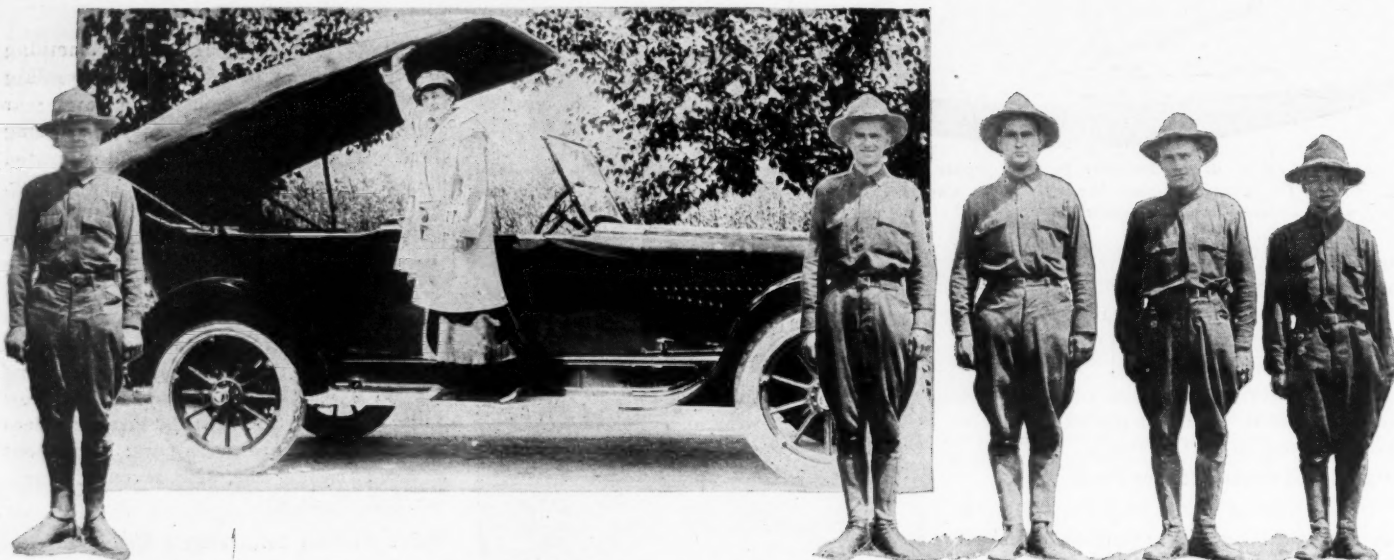
A combination dash and trouble lamp is marketed by the Auto Specialty Co., Galesburg, Ill. On the dash, behind the lamp socket, is an automatic reel carrying ten feet of lamp cord. A spring in the rewind reel holds the lamp to the dash as a dash lamp. When used as a trouble lamp, it is only necessary to grasp the lamp and take it where desired. The device can be applied to any car fitted with a dash light and the manufacturers will furnish complete directions for installation. The price is \$5, postpaid.



oxy-acetylene welding and cutting torch



Among the Makers and Dealers



HIGH SCHOOL GIRL SELLS CARS—The call for troops in the Mexican crisis took five of the eight owners and employees of a garage at Carlisle, Pa., and for several weeks Miss Myra Shearer, 16-year-old high school girl, has been demonstrating and selling Hudsons, Buicks, Hupps, Chevrolets and Dodge cars. When the eight men from the establishment were called to the colors, no competent

demonstrators for the five cars the firm is agent for were available, and the problem looked serious. Miss Shearer possessed considerable skill as a driver and suggested that she take her brothers' place and carry the sales season through. The books at Shearer Bros. give ample evidence of her successful activities. The picture shows the five brothers, and the girl in the act of demonstrating.

HERSCHELL-SPILLMAN Outing—The Herschell-Spillman Company, North Tonawanda, N. Y., will take its employes on an annual outing Saturday, August 5. There will be a boat ride on the Niagara river and athletic sports of various kinds.

Cummins-Monitor Increasing Output—The Cummins-Monitor Company, maker of two models of passenger cars, which has been located in a new factory building at Columbus, Ohio, is gradually increasing its output. The concern now is turning out between six and 16 cars weekly, and the demand is constantly increasing.

Hinckley, Chalmers Production Manager—Following the resignation of S. H. Humphrey as production manager of the Chalmers Motor Company, C. C. Hinckley, chief engineer of the company has taken over the production department in addition to directing the engineering work of the company.

Canadian Chalmers Formally Opened—With the formal opening of the plant of the Chalmers Motor Company, of Canada, Ltd., located at Walkerville, Ontario, Canadian motor car owners will have access to a popular make of car without paying excessive import duty. According to Harry S. Lee, general manager of the concern, the Canadian company is an entirely separate unit, building a car made up as far as possible of Canadian products.

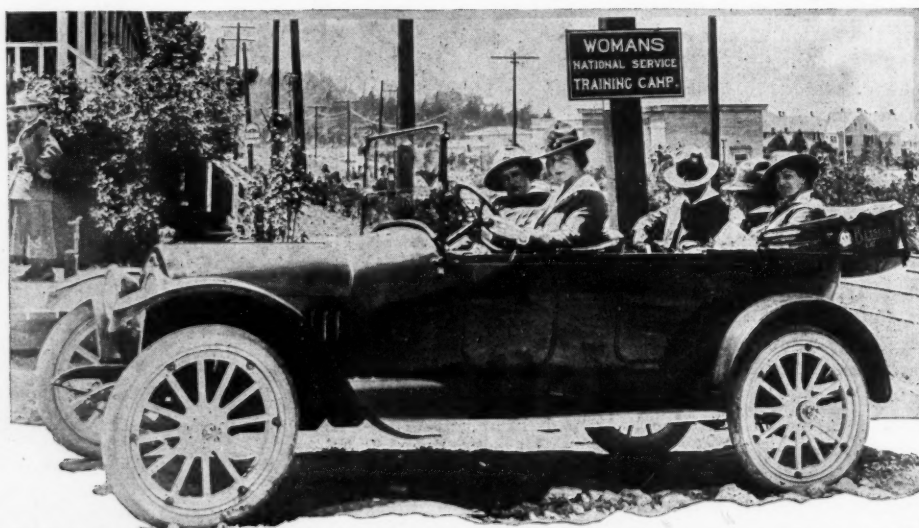
File Krit Final Report—Final reports in the case of the Krit Motor Sales Company, the bankrupt selling organization for Krit cars, were filed in the United States district court here last week, and show approximately \$13,000 of the company's assets remaining on hand. The total receipts for the sale of the property were \$81,126 and the total disbursements \$67,883, of the latter \$65,047 representing dividends to creditors amounting to 37½ per cent. Indications are that another dividend of about 4 per cent will be declared before the closing of the trusteeship.

The Union Trust Company was appointed trustee, following the placing of the company in bankruptcy on December 28, 1914.

Republic Truck Is Adding—The Republic Motor Truck Company, Alma, Mich., will erect two new factory buildings in which to manufacture the new model 9 ½-ton truck. The new buildings are to be erected just east of the old plant and will extend from Michigan avenue along Bridge street to the river. The main structure is to be 60 by 1,000 feet and one-story high. Parallel to the large building will be built a stockroom 36 by 500 feet. The two buildings will have a floor space of 48,000 square feet and will

cost about \$38,000. The company at present employs 700 men in the old factory, and this amount will be practically tripled upon completion of the new buildings, and as soon as the new model gets well under way.

New Gear Concern Active—The new plant of the C. A. S. Products Company, recently formed at Columbus, Ohio, with a capital of \$100,000, to manufacture the Foster gear, an invention of a Columbus man, has booked orders to keep the plant to capacity until June, 1917. C. D. Cutting of Detroit is president and general manager, and A. W. Tyler, secretary and superintendent. The plant has 50,000 square feet of floor space



MOTOR CAR PLAYS IMPORTANT ROLE—On the Pacific slope women folk are showing great activity in the movement of national defense work and preparedness. The illustration shows Sergeant at Arms Smith, of the National Service training camp at Presidio Barracks, near San Francisco, at the wheel of a Briscoe car which is used in many ways about the encampment. By their pleased expressions the young ladies are evidently enjoying the innovation. The camp course covers 15 days. Lectures on hygiene and first aid constitute the morning's work with the afternoons spent in military drilling and training.

and already additions and extensions have been started. More than 150 men are on the pay roll.

Cadwell Heads Carbureter Sales—C. J. Cadwell has been appointed sales manager of the Miller Carbureter Sales Corporation, with headquarters at Los Angeles, Cal.

Backus Baltimore Ford Manager—E. T. Backus has been appointed manager of the branch of the Ford Motor Co. in Baltimore, Md., which will be opened August 1.

Sealand Leaves Detroit Winton—Frank A. Sealand, manager of the Detroit, Mich., branch of the Winton Motor Car Co. for the last 4½ years, has resigned to become general manager for T. H. Towle, proprietor of the Cleveland-Cadillac Co., the Columbus-Cadillac Co., and the Toledo-Cadillac Co.

Robbins & Myers Cincinnati Manager—W. C. Williams recently has been appointed manager of the Cincinnati branch of the Robbins & Myers Co., Springfield, O. G. H. Liebel, former manager of that office, has resigned to devote his time to the Liebel Mfg. Co., Cincinnati, of which company he is now president and general manager.

Get Wheel Company Control—A deal was consummated last week whereby F. L. Burdick and Roy H. Hagerman have purchased the controlling interest in the Central Wheel & Mfg. Co., Sturgis, Mich. The purchase was made from Mrs. Emma Westendorf, formerly vice-president of the company. The company was organized in 1909, and its products include wheels of all sorts.

Oakland Is Adding—Announcement is made by the Oakland Motor Co., Pontiac, Mich., that their plans for greatly expanding their plant have been officially approved by President W. C. Durant, of the General Motors Co., and building operations will begin as soon as the buildings on the old Studebaker site have been removed. In addition to the four-acre site, formerly a part of the old Studebaker works, negotiations have just been completed for the annexation of the

block extending from Oakland Avenue to Howard Street, fronting on Baldwin. The new buildings will be occupied by a machine shop and additional assembly departments.

Johnson with Philadelphia Monroe—T. S. Johnson, for the last 2 years branch manager for the Oakland Motor Car Co., branch in Philadelphia, has been appointed eastern distributor by the Monroe Motor Co., Pontiac, Mich., with headquarters in Philadelphia.

Ford Employees Get Vacation—Notices are being given out to the workmen of the Ford Motor Co., Detroit, Mich., whereby most of the 30,000 employed in the Detroit factories will not be required to be at work from July 25 to August 7, during which period a complete inventory of the property valued at approximately \$100,000,000 will be taken. The company's fiscal year ends July 31.

Wayne Tank Increases Capital—Notice has been filed with the secretary of state by the Wayne Oil Tank & Pump Co., Fort Wayne, Ind., to the effect that the capital stock of the company has been increased from \$500,000 to \$700,000. The object of the increase is to provide for big additions to the plant. Among the improvements will be the construction of a big factory building nearly 400 feet long.

Hall Resigns from Olds—Jay Hall, general sales manager and associate executive of the Olds Motor Works, Lansing, Mich., for the last 3 years, has tendered his resignation, to take effect August 1. No announcement is made as to his plans, but it is generally believed that his resignation is merely preliminary to an appointment of even greater responsibility than his present duties.

Ford Branch at Fort Worth—On August 1 Fort Worth will become the distributing point and direct factory branch for the Ford Motor Co., for all the territory included in the midnorthern Texas, according to announcement made by Fred H. Jones, manager for the Fort Worth district. This will open a new field for the Ford branch at Fort Worth, as heretofore these supplies have

been furnished out of Dallas. Mr. Jones will continue as manager. F. H. Johnson, of Dallas, will become his assistant manager.

S. & S. Now Wilson & Co.—The sterilized curled hair so long concealed beneath the cushions of motor cars rises up and uncurls itself long enough to state that it will henceforth be known as Wilson's, rather than Sulzberger's. Announcement is made that the big Chicago packing house, Sulzberger & Sons Co., has changed its name to Wilson & Co., since Thomas E. Wilson has become the new president.

Atkins Carbureter Property Sold—The property of the Atkins Carbureter Co., Dwight, Ill., was sold at public auction last week. The machinery and personal property went to the A. D. White Machinery Co., Chicago, for \$800. The real estate was sold for \$1,000. The plant has not been profitable since its organization last year and recently a mortgage was foreclosed, the sale being made to satisfy the creditors.

Monroe Body Adding—Announcement is made that work is about to begin on two new buildings for the Monroe Body Co., Pontiac, Mich., an office building and a pressed steel plant. The office building will be a brick structure 25 by 56 feet, and one story high. The new factory building will front on the railroad a distance of 156 feet. The greatest depth will be 82 feet. The capital stock of the Monroe company has been increased to \$150,000.

Jackson-Church-Wilcox Adding—The Jackson-Church-Wilcox Co., Saginaw, Mich., manufacturer of the Jacox steering gear, has announced an addition to its plant, work on which will be begun at once. The new addition, which will be of brick, one-story, and 208 by 120 feet, will practically double the output of the concern. Eight hundred men will be given employment in the enlarged plant, which in its entirety will cover nearly two city blocks. With the proposed addition the next year's production of the company is expected to reach the half-million mark.

Recent Incorporations

Albany, N. Y.—Heat-Ometer Co.; motor car accessories, mechanical devices; capital stock \$5,000; incorporators, F. W. Osgood, A. Harris, L. V. Arouson.

Buffalo, N. Y.—H. E. Swezey Co.; to sell motor vehicles; capital stock \$30,000; incorporators, H. W. Pottle, R. A. Chilson, H. E. Swezey.

Buffalo, N. Y.—One Hand Auto Top Co., Inc.; capital stock \$600,000; incorporators, W. L. Grove, E. L. Kunz, F. Dobmeir.

Brooklyn, N. Y.—Batt-Motor Axle Co.; to manufacture motors, mechanism, axles, etc., combining motor and axle together as a single unit, engines, aeroplanes, etc.; capital stock \$100,000; incorporators, C. F. Batt, J. C. Snyder, J. McCormick, Jr.

Chicago—Reo Motor Car Co.; capital stock \$5,000; incorporators, Hayes McKinney, Temple Williams, J. F. Greathouse.

Champaign, Ill.—Holmes Automobile Co.; to handle the Studebaker line; capital stock \$20,000; incorporators, Will Holmes, E. H. Sperry.

Canton, O.—Wilson Rubber Co.; capital stock \$40,000; to make rubber articles; incorporators, Fred J. Wilson, Mabelle Hartzell, Wendell Harbruck, George W. Koehler and John C. Moore.

Cleveland, O.—L. & M. Auto Co.; capital stock \$10,000; to deal in motor cars; incorporators, L. Lamden, Louis J. Jacobson, Joseph N. Ackerman, and Joseph N. Bernstein and A. Gordon.

Cleveland, O.—Cleveland Tire & Rubber Co.; capital stock \$10,000; to deal in tires; incorporators, E. P. Schloesser, W. C. Kelley, M. L. Harrington, P. C. Jacobs and E. H. Rooke.

Cleveland, O.—Cleveland Standard Motor Co.; capital stock \$30,000; to deal in motor cars and accessories; incorporators, George W. Clarke, William M. Clark, W. B. Stewart, Paul J. Bickel and W. C. Merrick.

Cleveland, O.—Used Motor Car Co.; capital stock \$20,000; to deal in motor cars; incorporators, R. D. Neale, M. S. Foster, Charles H. Olds, S. W. Sangster and Frank J. Merrick.

Cleveland, O.—Knuteen Motor Truck Co.; capital stock \$50,000; to deal in motor trucks; incorporators, Otto F. Knuteen, George E. Hoffman, E. L. Kratzer, B. M. A. Little and A. L. Winsper.

Cleveland, O.—Knutsen Motor Truck Co.; capital stock \$50,000; incorporator, Otto F. Knutsen.

Cleveland, O.—Motorcraft Company, investments; capital stock, \$1,000; incorporators, Chas. W. Rush, William G. Radcliffe, L. E. Yaggi, Helen O'Boyle, R. E. Kouba.

Cleveland, O.—Master Motor Car Co.; capital

stock, \$10,000; incorporators, Charles W. Rush, William G. Radcliffe, L. E. Yaggi, Helen M. O'Boyle, R. E. Kouba.

Cleveland, O.—Esco Motor Lock Co., to manufacture locks for motor cars; capital stock, \$10,000; incorporators, Richard H. Lee, Fleming H. Crew, W. J. Patterson, G. M. Gallagher, and E. M. Holmren.

Cleveland, O.—Perfection Rubber Co., to manufacture and sell rubber articles; capital stock, \$40,000; incorporators, Edgar A. Hahn, M. M. Roche, Raymond L. McVean, Leo Henle, and Joseph F. Meyer.

Cincinnati, O.—Duttenhofer-Weibel Co.; capital stock \$10,000; to deal in motor car supplies; incorporators, Barton H. Weibel, Clifford G. Duttenhofer, Frank H. Kirchner, Val Duttenhofer, Jr., and David P. Schorr.

Cincinnati, O.—Cincinnati Chevrolet Motor Co.; capital stock \$5,000; to deal in motor cars; incorporators, C. H. Horn, W. B. Stewart, I. L. Nichol, L. L. Evans and Paul J. Bickel.

Cincinnati, O.—Battery Equipment Co., to operate a battery service station; capital stock, \$10,000; F. O. Andridge, H. M. Harvin, G. P. Walker, Ada B. Griffin and R. E. Ward.

Cincinnati, O.—National Fender & Auto Parts Co.; capital stock, \$50,000; incorporators, J. J. Shevlin, E. E. Simmons, L. Donovan, Wm. J. McCannely, John C. Hermann.

Danville, Que.—La Campagne D'Automobiles Agricoles Bruneau Limited; capital stock, \$100,000.

Dover, Del.—Security Automobile Lock Co.; to manufacture locks; capital stock \$100,000; incorporators, R. T. Benefield, L. J. Davis, W. L. Long.

Dallas, Texas—Nacokdoches Garage Co.; capital stock \$10,000; incorporators, N. J. Schmidt, Greer Orton and Ben T. Wilson.

Dillonville, O.—Dillonville Garage Co.; capital stock \$1,000; to operate a garage; incorporators, Ray C. Hess, R. F. Riggs, Louis Sommers, Homer J. Findley and Charles Nassiff.

Cleveland, O.—Cleveland-Chevrolet Motor Co.; capital stock \$5,000; to deal in motor cars and accessories; incorporators, I. L. Evans, Paul J. Bickel, W. B. Stewart, Rose Cone and I. L. Nichols.

Dallas, Tex.—Texas Oakland Co., of Dallas; capital stock \$60,000; incorporators, George P. Miller, C. L. Zutever, J. M. McCormick and French Davis.

Detroit, Mich.—Detroit Auto Safety Signals Co.; capital stock, \$10,000; incorporators, J. M. Glassmeyer, C. F. Hamilton, W. L. Wollaston, G. B. Smith.

Detroit, Mich.—Detroit Auto Piston Co.; capital stock, \$20,000; incorporators, Theodore A. Seltz, Charles R. Flanagan, Wm. H. Saffell.

Fond Du Lac, Wis.—Frost Tire Co.; capital stock, \$5,000; incorporators, Frank S. Frost, N. F. Frost and F. Baumann.

Hilliar, O.—Dobyns Motor Car Co.; capital stock, \$25,000; incorporator, Leroy Dobyns.

Hannibal, Mo.—Overland-Irwin Co.; to handle motor cars and do a general repair and supply business; capital stock \$20,000; incorporators, Leaton Irwin, F. R. Lusk, M. E. Lusk, Albert Wittler, C. H. Wood and A. B. Grubb.

Hilliard, O.—Dobyns Motor Car Co.; capital stock \$25,000; to deal in motor cars and accessories; incorporators, LeRoy Dobyns, Arlington C. Harvey, E. V. Mahaffey, M. D. Campbell and S. E. Smith.

Indianapolis, Ind.—Champion Auto Equipment Co.; capital stock, \$100,000; incorporator, D. F. Brooks.

Indianapolis, Ind.—Universal Accessories Co., supplies; capital stock, \$10,000; incorporators, Harvey B. Stout, Jr., C. E. Dunham, E. A. Hagnauer.

Joplin, Mo.—S. W. Overland Auto & Supply Co.; capital stock \$20,000; to deal in and repair motor vehicles; incorporators, Carl W. Lehnhard, A. F. Lehnhard and Willis W. Lehnhard.

Jacksonville, Ill.—Cherry Livery Motor Co.; capital stock, \$3,000; incorporators, John Cherry, Margaret Cherry, J. A. Vasconcellos, P. E. Cherry.

Lafayette, Ind.—American Motor Vehicle Co., motor vehicles; capital stock, \$25,000; incorporators, Jacob Weisenbak, William M. Crockett, Louis Marx.

Louisville, Ky.—Martin Motor Company; capital stock, \$5,000; incorporators, W. C. Martin, Ophelia Martin and A. G. Martin.

Toledo, O.—Ollar-Overland Co., motor cars; capital stock, \$10,000; incorporators, Howard Lewis, Elizabeth H. Watson, S. A. Carter, Frank S. Lewis, Frank M. Hackett.



From the Four Winds



TAKING THE MOUNTAIN TO MAHOMET

—The Rev. Orley L. Miller, Congregational minister at Centralia, Kan., has devised a way to give his members who own motor cars the fullest measure of pleasure from them, and at the same time maintain the attendance at Sunday evening service. He preaches on the church porch, where the orchestra and choir also are placed, and he invites the motor car owners to park their cars in the yard and street, and listen. They do so, riding around until time for service, then drawing up near the church. Chairs on the sidewalk and lawn provide for the minor proportion of the churchgoers who come afoot.

New York Licenses Olive and White—License plates for the Empire state for 1917 will be olive and white, the olive shade being the background. Three hundred thousand sets have been ordered.

Mustn't Spot Girls—Spotlight users on Duluth motor cars are being assessed \$3.00 each in municipal court. Use of these in the city is illegal and the police propose to stop the practice of spotting girls on the sidewalks as the cars pass.

Garage for Guests—The Kresky Investment Company, Kansas City, owner of the Woodlea hotel and the Knickerbocker apartments, and nearby houses in boulevard neighborhood, leased the two-story garage formerly owned by Bruening Brothers, for the convenience of the residents, who own among them fifty-seven cars.

Fast Coast Run—Making the run from Spokane to Seattle, Wash. in 14½ hours was the feat of Del. N. Larson of the Foster-Larson Company in a Paige 6-46. The run from Spokane to Wenatchee was made in 6½ hours via Davenport, Wilbur and Waterville, and from Wenatchee to Seattle in eight hours over Blewitt Pass to Cle Elum and through the Snoqualmie Pass to Easton. An average of 22½ miles per hour was maintained in crossing the Cascades.

Motor Bicycles Must Pay License—Patent motor attachments to bicycles are a species of the motor car and motorcycle, according to a ruling by Corporation Judge John F. Murphy, in a case tried before him in Dallas, Texas. He ruled that a bicycle carrying these attachments must carry numbers the same as motor cars and motorcycles. The decision was given in the case of P. Harrison, a federal employe, who was charged with speeding. A fine of \$10 was imposed. This is the first time the question has been passed upon in this state. The bicycles

have never before been required to be licensed. Under this ruling the owners must pay the regular 50-cent license and registration fee.

Buys Car with Nickels—Save your nickels and buy a motor car. In 3 years a Minneapolis hotel engineer got together 9,929 Buffalo five-cent pieces. He took them in a sack to the Ford Motor Co. and got a brand new car.

Pass Philadelphia Laws—With very few modifications, the ordinances regulating motor car traffic in Philadelphia were passed by councils before their recess. They are the most drastic and sweeping of any laws in this city for the regulation of traffic. Parking privileges in the congested and outlying districts are restricted, and in some sections

where traffic is heavy no more time is allowed than is necessary to discharge and take on passengers. The ordinances also include the regulation of horns, lights and highway signs.

Plan Million-Dollar Quarters—Preliminary plans for the erection of a million-dollar clubhouse are being completed for the Automobile Club of Canada, Montreal. The new clubhouse will be centrally located and will be fully equipped with garages, workshops, etc., and will be modeled on the lines of the New York Automobile Club's quarters.

Toledo Club Has Picnic—The annual outing and picnic of the Toledo Automobile Club, Toledo, O., held last week, was the largest and most successful in the history of the organization. The outing was held at the Bowling Green Fair grounds. Two thousand attended from Toledo and 500 more represented the clubs in Sandusky, Defiance, Wood and Ottawa counties.

Somerset, Pa., Forms Association—Residents of Somerset county, Pa., recently met at the courthouse in Somerset and organized a society to be known as the Somerset Automobile Association. President, Attorney F. W. Biesecker, Somerset; first vice-president, George J. Krebs, Somerset; second vice-president, D. L. Milliee, Confluence; secretary and treasurer, C. W. Walker, Somerset.

Naptha to Be Labeled—Frank Cumiskey, Kansas state oil inspector, after a conference with Governor Capper, issued an order to local inspectors to stamp all refined petroleum testing less than 59 as naptha. Dealer will be notified that when they receive purchases of gasoline stamped "naptha" they must sell it as naptha. It is charged that some dealers have been selling naptha as gasoline.

Quebec Has Good Roads—The province of Quebec is doing well in its road improvements. There are about 6,600 miles of highways in the whole province and the improved highways measure now approximately 2,000 miles. This has been done in the last 3 years and the good roads policy which the provincial government has carried out in that line has led the other provinces to follow on similar lines with benefit to the whole community.

Ohio Registration Receipts—According to a financial report the Ohio Motor Vehicle Bureau took in receipts amounting to \$1,200,237 for the fiscal year ended June 30, 1916. It required less than \$100,000 to operate the department, leaving more than \$1,100,000 to be turned over to the Ohio highway department for the maintenance and construction of roads. Registration of gasoline machines yielded \$1,099,567; electric cars, \$13,411, and motorcycles, \$41,155.

Tag Contract Awarded—The contract for motor car and motorcycle tags for 1917 has been awarded by Secretary of State Hildebrandt of Ohio, at 13.9 cents per set. This is the lowest price ever paid by the state for the tags which will amount to approximately 300,000 sets. The present contract calls for 15 cents per set. As was the case in 1916 the contract calls for owners' tags without any special lettering, electric owners' tags with an "E" and dealers' tags with a "D." The 1917 tags will be on a yellow background with black letters. The word "Ohio" will be up and down on one end and the figures "1917" up and down on the other end.

Coming Motor Events

TRACTOR DEMONSTRATIONS

Aug. 7-11—Fremont, Neb.
Aug. 14-18—Cedar Rapids, Ia.
Aug. 21-25—Bloomington, Ill.
Aug. 28-Sept. 1—Indianapolis, Ind.
Sept. 4-8—Madison, Wis.

SHOWS

January 6-13—New York show.
January 27-February 3—Chicago show.
March 3-10—Boston.
September 4-8—Hartford, Conn.
September (date undecided)—Cleveland.
January 13-20—Montreal.
October 14-31—Dallas, Tex.

With the Motor Clubs

Red Cross Sends Trucks—The Red Cross society has sent a Denby truck to the signal corps from Kansas City, and a Ford truck to Battery B.

Dependent Babes to Motor—The Toledo Automobile Club will take the dependent children of Toledo for an outing August 10 at Walbridge Park. It is an annual event for the club and about 1,000 dependent children are usually entertained.

Club Studies Jitney Situation—The Dallas Automobile Club (Dallas, Tex.) has begun the study of the jitney problem. Members of the club are to offer suggestions to city commissioners relative to an ordinance which will probably put the jitneys out of business in Dallas. "The street cars or the jitneys must go," city commissioners have said.

Motor Club Credits—The Springfield, Mo., Automobile Dealers Association has arranged with the United Mercantile Agency to handle credits, and to assist in bringing about other features of co-operation. The association appointed the following committee to make arrangements for the annual automobile show: Richard Tumphrey, chairman; W. H. Baldwin, B. B. Asbury.

Wheel Tax Constitutional—The Automobile club of Duluth, Minn., having failed to perfect its appeal, the wheelage tax is to be enforced at once. The lower court declared the tax constitutional. The tax was due May 1. The amount collected in 1915 was \$20,510.16. Motor car wheelage tax is 50 cents per horsepower. Electrics pay \$10. Automobile trucks, ton or less, are taxed \$10 and more than a ton \$7.00 per ton.

Maxwell Club to Build—The newly organized Maxwell club, composed of male employees of the Maxwell Motor Co., is soon to have a new clubhouse costing \$35,000, and containing a gymnasium, swimming pool, bowling alleys and billiard rooms. A unique feature of the clubhouse will be a dormitory, where guests of the club may obtain rooms while in the city. Although the organization is only a few weeks old, the membership already is close to 300.

Fight Oil Adulteration—The Columbus, Ohio, Automobile Club is back of an ordinance, which is pending in the city council to prevent the adulteration of gasoline with kerosene or other foreign body. The ordinance which will likely be enacted soon provides for a stiff fine for adulteration. This is to prevent dealers from mixing gasoline and kerosene, which has been done in Columbus to a large degree. The proposed provisions to fix the specific gravity and the boiling point was found to be impracticable.

Recognition of Funerals—Forth Smith, Ark., undertakers are trying to educate the public to the presence on the streets of funeral procession in motor cars. One firm has recently put into service complete motor equipment, but finds that the public does not recognize motor processions as funerals, and frequently cuts through the line in violation of ordinances.

Demands 5-Cent Bus Fare—The League for Municipal Ownership and Operation of New York City, through its president, Fredric C. Howe, has demanded that the Public Service Commission require the Fifth Avenue Coach Co. to operate its buses for a 5-cent instead of the present 10-cent fare. Mr. Howe quotes the report of the Public Service Commission to show that in 1915 the net income on the capital stock of \$50,000 was \$364,174.20, or about 725 per cent. This profit, Mr. Howe thinks, is excessive, and as a common carrier and therefore clearly under the jurisdiction of the commission, the coach company should not be permitted to continue to charge double the fare of any

other similar carrier in the city. Mr. Howe also avers that the traffic on the buses would increase greatly if a 5-cent fare were charged.

Club and Magistrate at War—A peculiar war has developed between the Automobile Club of Delaware County and Magistrate Harrigan of Paoli. The latter issued summons to about 450 motorists to appear before the court and pay their fines and costs, but the signs, which the magistrate says were ignored, are declared by J. H. Weeks, president of the club, to be illegal, and an advertisement to that effect was inserted in a Philadelphia newspaper advising all who had received notices to ignore them. Owing to several recent accidents in a certain part of Paoli, signs were placed for motorists to blow horns. While the magistrate said the letters on the signs are of the right size, President Weeks maintained they are illegally worded. Suits are threatened on both sides.



Hartford, Conn., Show—The Connecticut Fair Association announces that a motor car and truck exhibition will be held at Hartford, September 4 to 8.

Boston, Mass., Show—Dates for the annual motor show at Boston, Mass., have been set. The event will take place during the week of March 3, 1917, and continue until March 10.

Cleveland, O., Show—Cleveland, which usually holds its show in January, is to have its first pretentious fall show in September. This event is sponsored by the Cleveland Chamber of Industry.

Dallas, Tex., Show—At a meeting of the state fair directors last week plans were completed for the fall show to be held there October 14 to 31. The event will be in connection with the annual state fair.

Montreal, Que., Show—The Montreal Trade Association, Montreal, Que., announces that the annual motor show will be held January 13 to 20, 1917, thus preventing Montreal clashing with Chicago, as it has done for a number of years.



PIED PIPER NOT NEEDED; MOTOR KILLS RATS—The story from Topeka, Kan., of the park commissioner who made war on gophers by means of his exhaust, has given an idea to P. N. Cline, a farmer of Graham county, Kan. Mr. Cline mixed oil and gasoline in his supply tank, attached a rubber hose to his exhaust and turned the hose into a rat hole in the barn. Mr. Cline gathered four bushels of rats, the newspaper report says, which had scurried out and died upon reaching the open air. Hundreds of other rats are said to have died in their retreat.

Good Roads Activities

Solving Headlight Glare—The Maine Automobile Association, after a conference with representatives of motor organizations, dealers associations and public officials, has sent out a request to all members of the organization to put on some sort of devices to eliminate the glare.

Road Has Block System—So many cars are using the Blewett pass road across the Cascades now and the road is so narrow that the county commissioners of Chelan county, Wash., have found it necessary to establish a block signal system over the narrow canyon section road from Blewett to Engles creek.

Load Signs on Bridges—Several bridges in Kansas City have signs indicating the limit of weight that should cross them. The city commissioners are urging motor car owners to have their machines with full loads weighed, so that they will know accurately whether they are likely to transgress the orders on the signs.

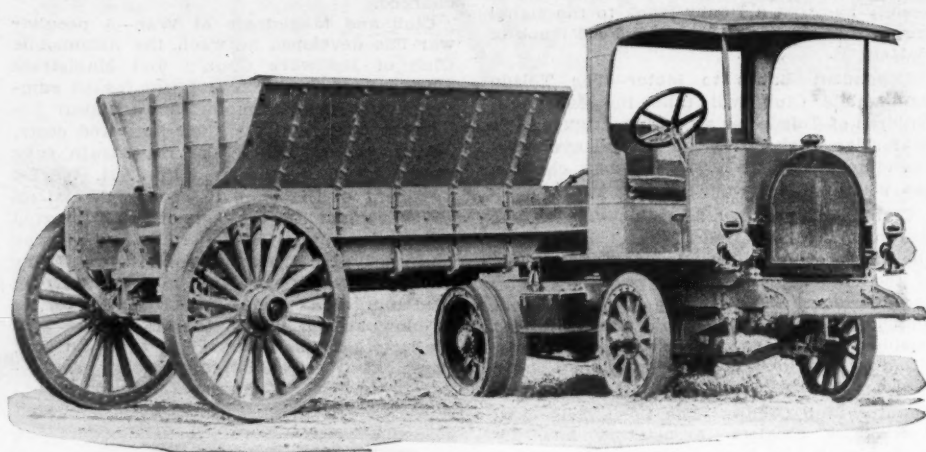
Highway Association Elects—Delegates from nine states have organized the National Parks Highway Association at Grand Canyon hotel, Yellowstone Park. Officers are: President, Gustave Holmes, Cody, Wyo.; secretary, L. L. Newton, Cody. H. J. Miller of Livingston is vice president for Montana and F. S. Webster of White Sulphur Springs is director for that state.

Log Texas Paved Way—D. E. Colp, secretary of the Texas State Highway Association, has completed the log of the proposed paved highway from Laredo to Texarkana, a distance of nearly 800 miles. He was accompanied on the logging trip by a United States highway engineer. The route will probably go through Dallas, Fort Worth, San Antonio, Austin and other important Texas towns.

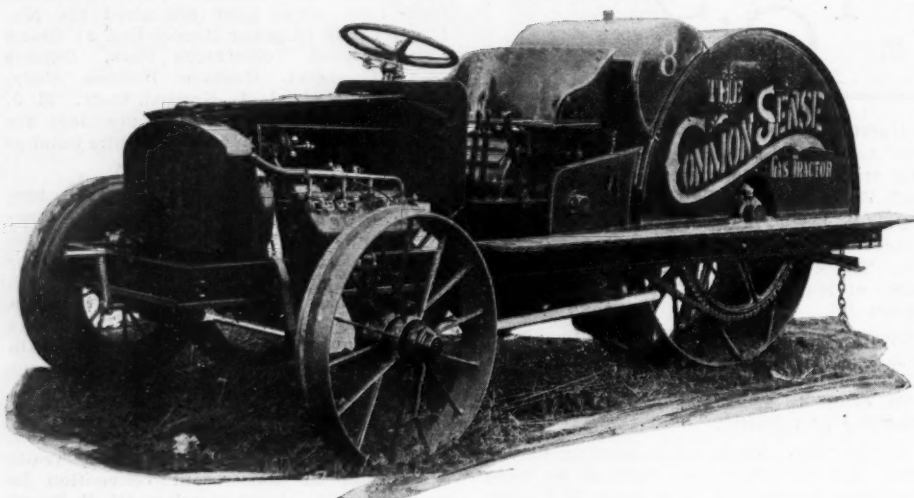
Good Roads Bond Issue—The work of detailed organization to carry out the good roads plans adopted by the Ozark Trails Association at the recent convention in Springfield, Mo., is progressing. W. H. Sneed of Springfield, has completed the organization in Maries, Osage, Gasconade and Franklin Counties, whereby good roads leaders in these divisions have agreed upon a plan to promote the northern route from Springfield to St. Louis. Immediate steps will be taken to obtain a vote on a bond issue that will total \$300,000.

Two New Tractors—One for Plow and One for Road Work

Unusual Features Evident
—One Has Eight-Cylinder Motor, the Other
a Sub-Frame
Chassis



A short wheelbase gives the Watson tractor a remarkably short turning radius



The Common Sense tractor has eight cylinders and is chain-driven

THE first eight-cylinder tractor ever made is introduced by the Common Sense Tractor Co., Minneapolis, Minn. It is built on the same general lines as the four-cylinder machine which this company has been marketing.

The new model has already been thoroughly tested in the field. In one test 80 acres were plowed with the tractor pulling six 14-inch plows six inches deep in gumbo on high speed at 4 miles an hour. For the whole 80 acres 3 gallons of cylinder oil and 120 gallons of gasoline were used, according to the makers. This is an average of $1\frac{1}{2}$ gallons of gasoline per acre and supports the claim of the manufacturers that the new machine is unusually economical in fuel consumption.

The eight-cylinder tractor is equipped with cut-steel gears, has only two gear reductions, double-chain drive, using the Diamond roller chain, heavy-duty Hyatt roller-bearings throughout, Berg and Beck clutch, Pickering governor, K-W high tension ignition system and the Common Sense automatic steering device.

The machine pulled 1,100 pounds on the drawbar in a test made under the supervision of the University of Minnesota agri-

culture college, developing a drawbar pull of 32-horsepower on the 3-mile gear ratio.

The Watson Tractor

A five-ton tractor with an 80-inch wheelbase affording unusually short turning radius, is announced by the Watson Wagon Co., Canastota, N. Y. The wheelbase of the 120 cubic foot trailer, which is also a Watson product, is 11 feet $3\frac{1}{2}$ inches and the entire unit, both tractor and trailer, can be turned in a 31-foot circle. By backing just once this combination can be turned in a street that is only 20 feet wide from curb to curb.

An unusual feature of the Watson tractor is the spring suspension. The designers had in view the idea that a tractor is more or less racked to pieces when running empty with the ordinary type of heavy suspension springs and accordingly have embodied two separate sets of springs and two frames.

The power plant, gasoline tank and driver's seat are carried on a set of lighter springs, designed to carry a certain constant load accomplished by the use of a sub-frame. The sub-frame is mounted through these springs onto the main frame which is in turn mounted on heavy-duty

springs to take care of the carried load.

The motor is a Continental, four-cylinder $4\frac{1}{2}$ by $5\frac{1}{2}$, with the cylinders cast in pairs and valves enclosed. It is suspended on three points and is equipped with a model D U 4 Bosch magneto. A Brown-Lipe selective sliding gearset with four speeds forward and a reverse is bolted to the motor crankcase. All gears and shafts operate on Timken bearings.

Wheels are single 34 by 4 on the front and dual 36 by 5 on the rear of the S. A. E. demountable type. Tread is 61 inches in the front and $64\frac{3}{4}$ in the rear. The maximum speed is 11 miles an hour. Equipment includes oil lamps, hand Klaxon horn, and a 5-ton jack.

FEW CARS IN HAITI

Washington, D. C., July 28—The special agent of the bureau of foreign and domestic commerce of the department of commerce reports that use of motor cars in the island of Haiti is very limited. At present, outside of the trucks and passenger cars used by the marine corps, there are not over four motor cars in Port au Prince that are running. Gasoline is 60 cents a gallon.

In 1913 there were some twenty motor cars in and around Port au Prince. Most of these were of a cheap make and came from the United States. Perhaps more than half of the number were operated as public conveyances. The bad condition of many of the Port au Prince streets and of the roads contiguous to the city soon shook the vehicles loose in every bolt.

Further, the chauffeurs were said to be incompetent and careless. It is related that they would start on a trip with no knowledge whatever as to how much gasoline was on hand. The car would run out of fuel at some remote place perhaps and the driver would leave it where it stalled. There it would remain for possibly a week, and meanwhile the torrential rains and blazing sun were not helping the general condition of the vehicle.